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Aircraft Ground Deicing Training and Qualification Program

RATIONALE

This revision includes changes to Qualifications in Sections 2, 4, and 6 (see 2.3.1, new definition DEICING QUALIFICATION) and minor updates following AS6285 Revision F (includes Table 1A Conversion from current to previous DI-L codes).

Other changes (minor updates):

- Foreword: Alignment with AS6285
- References to AS6285 for quality checks (see A.11.2)
- Allowance times (see A.5.4)
- Reorganization of text: Paragraph 6.7 (clarity) and Tables 7, 8, and 9 (removal of repetitive words)
- Harmonization, where possible, of words such as “application,” “spray,” and “treatment”
- Corrections: Deletion of duplicate paragraph under 6.6.3 and redundant bullet in A.13.3 Figure A11 title

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FOREWORD

AS6286 functions as the Global Deicing Training Manual by providing industry standards for training and qualifications used to perform proper aircraft ground deicing, whether using fluid—AMS1424/1428 qualified Type I, II, III, IV—or non-fluid methods.

AS6285 is the foundational document in a trilogy, which includes AS6286 and AS6332. These three form a unified whole and are categorized as the Global Aircraft Deicing Standards.

Exposure to ground weather conditions conducive to ice formation can cause frost, snow, slush, or ice accumulation on aircraft surfaces and components. These contaminants can adversely affect aircraft performance, stability, control, and mechanical devices (such as control surfaces, sensors, flaps, and landing gear). Consequently, the presence of frozen deposits unaccounted for during aircraft certification can compromise aerodynamic performance.

A number of authoritative regulatory entities converge in direct contribution toward development of these global standards, providing regulations and guidance governing aircraft operations in ground icing conditions: these include the International Civil Aviation Organization (ICAO), the Federal Aviation Administration (FAA), the European Union Aviation Safety Agency (EASA), and Transport Canada (TCCA). These regulations prohibit aircraft dispatch or takeoff when frozen contaminants are present on critical surfaces or components—a critical surface or component is one which could adversely affect the mechanical or aerodynamic function of an aircraft—and this prohibition is addressed by the Clean Aircraft Concept, which mandates removal of frozen deposits adhering to aircraft surfaces or critical safe flight components prior to takeoff and functions as the guiding principle toward which all efforts of this document strive. In the event of differences or discrepancies between this standard and domestic end-user regulations, the latter shall prevail.

This document specifies qualification standards for training and staffing, thus providing guidance for supporting a proper ground deicing training and qualification program—in addition to offering training content. Although references are made to AS6285 and AS6332, this document functions as a training program support and assists in developing and executing training and qualification processes. For the latter purpose, standardized teaching plans and practical assessment methodologies are included. The approach is to utilize various international documents in tandem with SAE standards and SAE members (who contributed via editorial comments), resulting in the creation of AS6286, the *Global Deicing Training Manual*.

Aircraft ground deicing entities are responsible for complying with local regulations and requirements imposed by aircraft, equipment, and fluid manufacturers, coupled with regulatory and environmental authorities.

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1. SCOPE

1.1 Field of Application

This document establishes the minimum training and qualification requirements for ground-based aircraft deicing methods and procedures. All guidelines referred to herein are applicable only in conjunction with the applicable documents. Due to aerodynamic and other concerns, the application of deicing fluids shall be carried out in compliance with engine and aircraft manufacturers' recommendations. The scope of training should be adjusted according to local demands. There are a wide variety of winter seasons and differences of the involvement between deicing operators, and therefore, the level and length of training should be adjusted accordingly. However, the minimum level of training shall be covered in all cases. As a rule of thumb, the amount of time spent in practical training should equal or exceed the amount of time spent in classroom training.

1.2 Agreements and Contracts

This information is recommended as a basis for operations and service support agreements.

1.3 Hazardous Materials

While the materials, methods, applications, and processes referenced to or described in this specification may involve the use of hazardous materials, this standard does not address the hazards which may be involved in their use. It is the sole responsibility of the user to ensure their familiarity with the safe and proper use of any hazardous materials and processes and to take all necessary precautionary measures to ensure the health and safety of all personnel involved.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document shall take precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 1-877-606-7323 (U.S. and Canada only) or 1-724-776-4970 (outside U.S. and Canada), www.sae.org.

AMS1424	Fluid, Aircraft Deicing/Anti-Icing, SAE Type I
AMS1424/1	Deicing/Anti-Icing Fluid, Aircraft SAE Type I Glycol (Conventional and Nonconventional) Based
AMS1424/2	Deicing/Anti-Icing Fluid, Aircraft SAE Type I Non-Glycol Based
AMS1428	Fluid, Aircraft Deicing/Anti-Icing, Non-Newtonian (Pseudoplastic), SAE Types II, III, and IV)
AMS1428/1	Fluid, Aircraft Deicing/Anti-Icing, Non-Newtonian (Pseudoplastic), SAE Types II, III, and IV Glycol (Conventional and Nonconventional) Based
AMS1428/2	Fluid, Aircraft Deicing/Anti-Icing, Non-Newtonian (Pseudoplastic), SAE Types II, III, and IV Non-Glycol Based
AIR8468	Ancillary Deicing/Anti-Icing Information
ARP1971	Aircraft Deicing Vehicle - Self-Propelled
ARP5660	Deicing Facility Operational Procedures
AS5900	Standard Test Method for Aerodynamic Acceptance of AMS1424 and AMS1428 Aircraft Deicing/Anti-Icing Fluids

AS6285 Aircraft Ground Deicing/Anti-Icing Processes

AS6332 Aircraft Ground Deicing/Anti-Icing Quality Management

AS9100 Quality Management Systems - Requirements for Aviation, Space, and Defense Organizations

2.1.2 FAA Publications

Available from Federal Aviation Administration, 800 Independence Avenue, SW, Washington, DC 20591, Tel: 866-835-5322, www.faa.gov.

FAA Holdover Time Guidelines (current issue - annual publication)

FAA, Notice N 8900.ZZZ, "FAA-Approved Deicing Program for Winter 20xx-20yy" (current issue - annual publication)

FAA, Ground Deicing Program - General Information (current issue - annual publication)

2.1.3 ICAO Publications

Available from International Civil Aviation Organization, 999 Robert-Bourassa Boulevard, Montréal, Québec H3C 5H7, Canada, Tel: +1 514-954-8219, www.icao.int.

ICAO Doc 9640 AN/940 Manual of Ground De-icing/Anti-icing Operations

ICAO Doc 9835 AN/453 Manual on the implementation of ICAO Language Proficiency Requirements

ICAO Annex 6, Operation of Aircraft, Part 1 - International Commercial Air Transport - Aeroplanes

ICAO Doc 4444 ATM/501 - Procedures for Air Navigation Services - Air Traffic Management

2.1.4 ISO Publications

Copies of these documents are available online at www.iso.org/store.

ISO 9001 Quality management systems - Requirements

2.1.5 Transport Canada Publications

Available from Transport Canada, Tower C, Place de Ville, 330 Sparks Street, Ottawa, Ontario K1A 0N5, Canada, Tel: 1-888-830-4911, www.tc.canada.ca.

Transport Canada, Holdover Time (HOT) Guidelines Regression Information (current issue - annual publication)

Transport Canada Holdover Time Guidelines: Winter 20xx-20yy (current issue - annual publication)

Transport Canada, TP 14052E, "Guidelines for Aircraft Ground Icing Operations" (current issue - annual publication)

2.2 Related Publications

The following publications are provided for information purposes only and are not a required part of this SAE Standard.

Aircraft Manufacturer and Operator Manuals

2.3 Definitions and Abbreviations

2.3.1 Definitions

DEICING: Is used in this document as a generic term to cover both deicing and anti-icing.

DEICING QUALIFICATION: There are 3 levels to learning the job:

1. Preliminary: When an employee attends a deicing course and has been trained in the basics of deicing and anti-icing, they can be deemed as having fulfilled the preliminary requirements, to deice aircraft.
2. Evaluatory: They then enter an evaluatory period under scrutiny, which will include an assessment of skills. Assessments and evaluations can be under real or simulated winter conditions, given that winter conditions are not always available.
3. Qualified: An employee who has fulfilled all qualification requirements as per 6.1 can be judged to be out of the evaluatory period and fully qualified. Management and Instructor decision. Local conditions always take precedence.

HEAD OF DEICING TRAINING: The person responsible for ensuring the effective delivery of the deicing training of personnel for the whole organization. This person must have a complete understanding of the subject matter herein and a documented competence level. By agreement of the senior management team, this may also be the Winter Program Manager/Responsible Person/Accountable Executive.

FLIGHTCREW TRAINER: The person responsible for deicing training for flightcrews.

QUALITY MANAGEMENT SYSTEM: The ability to demonstrate both management commitment to and the organizational ability to deliver the required level of product or service.

SENIOR MANAGEMENT TEAM: A team of individuals at the highest level of management of an organization who are responsible for ensuring the proper delegation and delivery of performance for the day-to-day tasks of managing winter operations.

WINTER PROGRAM MANAGER/RESPONSIBLE PERSON/ACCOUNTABLE EXECUTIVE/ACCOUNTABLE PERSON: The person responsible for ensuring that the processes needed to maintain the quality of systems to comply with the clean aircraft concept.

For other definitions, refer to AS6285.

2.3.2 Abbreviations

ATC	air traffic control
ATCT	air traffic control tower
CBDS	computer-based deicing simulator
CBT	computer-based training
QMS	quality management system

Refer to AS6285 for other definitions and abbreviations that are not listed within this section.

3. THE REQUIREMENTS FOR CLEAN AIRCRAFT IN WINTER - ORGANIZATION AND TRAINING

3.1 The Requirement for Clean Aircraft in Winter Operations

The smooth flow of air over the wings of an aircraft provides the lift necessary for flight. The continued optimization of aerodynamic surfaces over time has led to increasing efficiency gains and safety improvements. However, exposure to weather conditions on the ground that are conducive to ice formation can cause the accumulation of frost, snow, slush, or ice on aircraft critical surfaces and components that will adversely affect aircraft performance and control. The operation of mechanical devices, such as control surfaces, sensors, flaps, and landing gear, will also be affected. If frozen contamination is present, other than that approved via the aircraft certification process, the ability for the aircraft to fly safely may be greatly reduced and will cause potentially dangerous conditions. An aircraft ready for departure must be a clean aircraft that has no frozen contaminants adhering to any critical surface. Regulations governing aircraft operations in icing conditions shall be followed. The International Civil Aviation Organization ICAO "Annex 6, Part I" mandates specific rules for the safe operation of aircraft during ground icing conditions, and all member states are required to have regulations in place to ensure this:

4.3.5.6: A flight to be planned or expected to operate in suspected or known ground icing conditions shall not take off unless the aircraft has been inspected for icing and, if necessary, has been given appropriate deicing/anti-icing treatment. Accumulation of ice or other naturally occurring contaminants shall be removed so that the aircraft is kept in an airworthy condition prior to takeoff.

A critical surface or component is one which could adversely affect the mechanical or aerodynamic function of an aircraft. As frozen contaminants of almost any kind can compromise the safety of an aircraft, deicing and anti-icing methods are used to ensure that aircraft critical surfaces are clean for takeoff. The purpose of these deicing and anti-icing techniques is best described by the clean aircraft concept. The clean aircraft concept means that an aircraft must be free of all frozen contamination that could prevent a safe takeoff. The most common deicing and anti-icing (commonly combined as "deicing") technique is the application of deicing fluids, although other mechanical and physical methods may be used. SAE fluid types are both deicing and anti-icing fluids, but the different types are commonly used as one or the other; thus, two separate fluids are often used to ensure a clean aircraft.

Deicing fluids are used to remove existing contamination. They are normally supplied as a concentrate.

For maximum effect, deicing fluids shall be applied close to the surface to minimize heat loss. Fluid temperature and pressure should not exceed aircraft maintenance manual requirements. 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 deicing fluid will prevent refreezing for a period of time, depending on aircraft skin and outside air temperature (OAT), the fluid used, the mixture strength, and the weather.

Deicing fluids are not primarily intended to prevent adherence of further active frozen contamination, although limited protection is afforded by the heat from the fluid. When that protection is relied upon to keep an aircraft clean for takeoff, then the Type I is being used as both a deicing and an anti-icing fluid. Other fluids and mixtures can be used to deice dependent on experience and availability, such as:

1. Heated water (only when above freezing conditions).
2. Heated mixture of water and Type I fluid.
3. Heated premix Type I fluid.
4. Heated Type II, III, or IV fluid.
5. Heated mixture of water and Types II, III, or IV fluid.

NOTE 1: All of the above have a specific effect (deicing or holdover time) based on the temperature at which they are used. These are all defined (except water which has no HOT) in the FAA and TC Holdover Guidelines. They are published each year, and only current tables shall be used for operational purposes.

NOTE 2: Unheated fluids are ineffective to deice.

Anti-icing fluids are designed and used to protect treated surfaces from contamination for a specified range of times (the “holdover time”). Fluid Types II, III, and IV are usually applied unheated. The holdover time allows the aircraft to move to the runway from the location where it was treated, and then remain in the takeoff queue for a limited time, without the danger of active frozen precipitation adhering to the treated surfaces prior to takeoff. Integral to the design of these fluids is that they must not excessively interfere with the smooth flow of air over the surfaces at takeoff. Anti-icing fluids therefore have two distinct performance criteria: (1) to remain on the aircraft, preventing active precipitation from adhering, until the start of the takeoff roll and (2) to flow off of the surfaces during the takeoff, which is referred to as the aerodynamic performance requirement. The SAE Standards AS6286, AS6285, and AS6332 have been written to give best-practice guidance for the use of deicing fluids to provide a clean aircraft for a safe takeoff.

3.2 Organizational Requirements

The organizational requirements for the effective and safe deicing of aircraft during winter weather are described in more detail in AS6332. A short summary is provided here as an introduction to these requirements. The main concepts contained in AS6332 are based on the quality management methods set out in ISO 9001 and can be summarized in two points:

- The need to demonstrate and consistently provide a product or service that meets customer and applicable regulatory requirements, plus
- Aims to enhance the product or service through effective systems and processes for continual improvement

For aircraft deicing, the safety-critical nature of this work requires complete conformance to the principle of the clean aircraft concept, as this is the critical customer and regulatory requirement. It involves both conformance to standards of operation and its continual improvement in line with the principles of quality management. The deicing service provider shall establish, document, implement, and maintain a quality management system (QMS) and continually improve its effectiveness. The deicing service provider shall:

- Determine the processes needed to manage effective aircraft deicing
- Determine the criteria and methods needed to ensure that the operation and control of these processes are effective
- Ensure the availability of resources necessary to support the operation and monitoring of these processes
- Monitor, measure (where applicable), and analyze these processes
- Implement actions necessary to achieve the planned results and to continually improve these processes

NOTE: The extent of the QMS documentation can differ from one organization to another due to:

- The size of the organization and types of activities
- The complexity of their processes and interactions and the competence of the personnel

3.3 The Essential Elements of a Deicing Training Program

3.3.1 Organization

An organization shall have in place within its management plan and organizational structure descriptions of key personnel (e.g., Head of Deicing Training, Winter Program Manager, Deicing Training Instructor, etc.) and their duties pertaining to training, qualification, and oversight responsibilities. The management plan and the structure of the organization shall specify the individuals who are responsible for the deicing training program. The individuals specified with this responsibility shall have sufficient knowledge of deicing operations and training to be qualified for this position. Although this qualification may be renewed annually, it is recommended that the responsible individuals complete training and qualification on an annual basis through self-study, under the oversight of their superior or responsible designee (where applicable), as specified within the organization's management plan and organizational structure.

Deicing training shall be conducted exclusively by personnel who are trained, qualified, and proficient within the relevant subjects applicable to the personnel they are designated to instruct (e.g., flightcrew, dispatch, or ground personnel) or by other personnel or through other means under the oversight of such qualified individuals. Individuals designated to develop or facilitate deicing training should have some familiarization, background, and training in the area of education and facilitation techniques through relevant experience or education. This training may be performed as part of a train-the-trainer program. Individuals designated to conduct deicing training within an organization's management plan and organizational structure shall be required to complete initial and subsequent annual recurrent training in order to maintain their qualification. This training shall be facilitated internally within an organization by an individual responsible for this function as specified within the organization's management plan and organizational structure (e.g., Training Manager/Head Trainer) or other personnel as designated, or by a third-party organization (e.g., air operator, contracted deicing training vendor, etc.).

3.3.2 Training of Deicing Personnel

Only trained and qualified personnel shall perform deicing procedures. A deicing training program shall be maintained and executed by the organization that performs the deicing. The training program shall address all elements of the training material, levels of qualifications, verification of success, functions, duties, responsibilities, quality control, and regular overview of instruction. The training program shall refer to current industry standards and regulations. All training records shall be kept as per the regulatory or company's recordkeeping policy. The training program shall be reviewed at least annually to ensure that it covers all current aspects of deicing operations.

The Head of Deicing Training is responsible for developing the training program. The Head of Deicing Training may also be the instructor. In that case, previous deicing experience is strongly recommended. The company shall evaluate and approve the Head of Deicing Training for the task according to established requirements. This approval by the senior management team shall be documented.

3.3.3 Computer-Based Training

Computer-based training (CBT), e-learning/distance learning, and computer-based deicing simulators (CBDS) may be utilized in place of traditional instructor-facilitated training for theoretical training components and limited practical training components (dependent on the CBDS level utilized). It is recommended that CBT/e-learning/distance learning or CBDS training be facilitated and administered under the oversight of suitably qualified training personnel.

To simulate classroom interactivity, it is recommended that when a trainee requires assistance or has a question, there be various means in place so that the assistance can be obtained or the question can be answered prior to completion of the course and before exams or evaluation. This may include the use of poll questions, email, online assistance, etc.

It is recommended that if CBT/e-learning or CBDS is used as part of the examination or evaluation process, effective measures should be in place to prevent academic dishonesty and plagiarism (i.e., individual login/password, random questions drawn from a question pool, measures to prevent skipping/fast-tracking of training, oversight by a proctor, etc.).

It is the responsibility of the CBT/e-learning or CBDS manufacturer/developer and user to ensure that all applicable requirements as stated within this document are met, as applicable to the personnel they are intended to instruct.

3.4 The Complementary Fit between AS6286, AS6285, and AS6332

While the AS6286 standard deals with the key requirements for training personnel for deicing, it is complementary to two other standards with which it should be read, interpreted, and understood. The three complementary standards are:

- AS6285: Aircraft Ground Deicing Processes
- AS6286: Aircraft Ground Deicing Training and Qualification Program
- AS6332: Aircraft Ground Deicing Quality Management

While this standard focuses on the training aspect of deicing, a complete understanding of the processes and quality management aspects is only available through the full appreciation of the other two standards.

4. AUTHORITY AND ROLES IN DEICING

NOTE 1: There shall be a local note of restriction to any qualification if some of the duties are not performed as mentioned. The local differences and tasks must be clearly described in local processes and documentation.

NOTE 2: Where relevant, local procedures shall be taken into account and emphasized more than others in local documentation (e.g., some airports perform only centralized deicing, and some perform a mixed gate and centralized operation, single person vehicle drive etc.).

Local settings may demand more extensive training, and the recommendations in this standard are not binding for audit purposes. **See Table 1, final row # and note.**

- **The Qualification alpha-numeric system (DI-L10 etc.)** is the accepted global numbering system. It is perfectly acceptable for local operations to use a completely different numbering/ident system and also to split them into sub-units for local use (e.g., DI-L11, DI-L12 etc.). However, compliance with this standard can only be shown if full compliance with the qualification requirements are fulfilled (as described here) and read-across **must be shown in local documentation**.

The qualification level for all operational positions shall be clearly defined. Qualified people shall be fully aware of their approved functions. An individual may hold several approvals depending on the job function.

A suggested structure for levels and groups of qualifications is given in 4.3. (DI-L = De Icing – Level).

Qualifications are defined below as separate functions, it is perfectly acceptable, under local resource requirements, to combine qualifications under one person with read-across to the standard.

- **Recommended times** are in Appendix B.2 of this document.
- **“Deicing” is used here** as an abbreviation for “deicing/anti-icing”.

See 2.2 “Head of Deicing Training.”

Operational tasks must have a training program leading to a qualification, (driving, performing checks, communicating, spraying, and other local tasks as applicable). Associated tasks require a qualification as they are indirectly impacting operations (e.g., instructors, fluid quality testing, engine contamination removal, etc.). See Table 1.

Management roles and supervision tasks do not require a qualification, but do require a company nomination for the role and appropriate training for generic knowledge of the tasks operated locally. These can be but are not limited to, Head of Deicing Training, Deicing Auditor, for example.

Prequalifications: The local procedures and training program requirements, must define the pre-required qualification for staff selection. These can be, e.g., appropriate driving license as required by the local airport, English language proficiency as used locally, general aviation knowledge, human factors, SMS, airside safety, etc. **See Table 1, final row #.**

4.1 Senior Management Team

Senior management shall:

- Provide evidence of its commitment to the development and implementation of a suitable management system for the effective deicing of aircraft.
- Ensure that responsibilities and authorities are defined and communicated within the organization.
- Appoint a winter program manager on an annual basis as the responsible person accountable to senior management for the effective delivery of this service.
- Establish position requirements for and appoint a head of deicing training. For more detailed and specific guidance on the roles of the senior management team, the winter program manager, and the head of deicing training, refer to the appropriate section of AS6332.
- For clarity and auditing on annual re-appointment (bullets 3 and 4 above): A document with an automatic self-renewal date is acceptable, i.e., a new, redated document is not required every year if the same person is continuously appointed.

4.2 Winter Program Manager and Head of Deicing Training

NOTE: If agreed by senior management, 4.2.1 and 4.2.2 functions can be combined for local resource reasons.

4.2.1 Winter Program Manager

Senior management shall appoint a manager on an annual basis who, irrespective of other responsibilities, shall be responsible for:

- Ensuring that the process needed to maintain the quality of systems to deliver clean aircraft during winter operations are established and maintained
- Reporting to senior management on the performance and effectiveness of these systems and any need for improvement
- Ensuring that the need to conform to the clean aircraft concept is communicated throughout the organization
- Responsible for communications, processes, equipment and must understand the requirements of the relevant SAE Standards and customer (airline) procedures.

4.2.2 Head of Deicing Training (see also DI-L120, 4.11)

Senior management shall confirm this appointee on an annual basis. Irrespective of other responsibilities, they shall be responsible for:

- Ensuring that their own understanding and competence is sufficient to hold this position and
- Ensuring the effective delivery of the training program for the organization

4.3 Operational and Support Levels of Training and Qualification (DI-L = De Icing - Level)

Operational

DI-L10	Deicing Vehicle Driver
DI-L20	Deicing Operator
DI-L30	Engine Contamination Removal Personnel
DI-L40	Deicing Supervisor
DI-L50	Deicing Checker
DI-L60	Deicing Coordinator
DI-L70	Communicator

Support/Ancillary

DI-L80	Fluid Quality Inspector (laboratory staff)
DI-L90	Fluid Quality Inspector (non-laboratory staff)
DI-L100	Deicing Instructor
DI-L110	Deicing Auditor
DI-L120	Head of Deicing Training
DI-L130	Flightcrew (winter operations) [basics of deicing]
DI-L140	Cabin crew (winter operations) [basics of deicing]

See Table 1A (DI-L **Substitution chart**: AS6286D to **AS6286E**).

Qualification of both initial and continuation (recurrent/requalification) training is achieved after successful theoretical training is completed (including a written examination) and practical training is also successful (including assessment according to qualification level requirements).

All qualifications shall be renewed annually, this means and includes theoretical instruction, practical training, and written examinations.

If the same person is performing several duties, then the training topics do not need to be covered repeatedly for each initial or continuation level of qualification. In order to maintain each qualification, it is highly recommended that the company keep records of the experience of each individual.

The level of experience is recommended to be such that each individual is familiar with all relevant elements of the qualification responsibilities and can perform the required task in a safe manner.

The program and records shall reflect the experience in performing the tasks of the relevant qualification. If the experience in actual conditions is limited after the winter season, it is recommended that the annual recurrent training of the individual reflects this lack of adequate experience in order to have all relevant operational topics refreshed more thoroughly.

4.3.1 Duration and Content of Training

The length of time required for theoretical and practical training will vary among operators and will also vary depending on local conditions. All elements relevant to a specific deicing qualification level should be covered in training as recommended in Table 1 or 2.

Guidance for course content to use in theoretical training is provided in Tables 3 and 4 (see 6.2). A written exam for theoretical training must be completed in accordance with the process described in 6.3. Tables 5 and 6 provide elements for practical training. Assessments of the trainee must be performed during practical training in accordance with the process described in 6.5 (see following comment).

NOTE: For the *basic* knowledge requirements of DI-L10 to DI-L70, consult Table 1.

4.4 Deicing Vehicle Driver, DI-L10

The deicing vehicle driver qualification (DI-L10) qualifies the person to maneuver and drive the vehicle. It does not include any other deicing levels.

4.5 Deicing Operator, DI-L20

The deicing operator qualification includes:

1. The contamination check (check for the need to deice the aircraft).
2. Performance of deicing treatment, and the post deicing check.

4.6 Engine Contamination Removal Personnel DI-L30

This task requires training for the local equipment used to remove contamination from engines/propellers, the procedure to remove contamination removal from engines and propellers, general deicing knowledge, safety aspects of the task, and other training as locally required. Training is approved by theoretical training and a written exam, practical training, and an assessment for initial training.

This qualification, on its own, does not qualify staff to be classified as deicing crew.

4.7 Deicing Supervisor, DI-L40

This level of qualification includes: Management appointment.

Supervising the actions of other deicing operators.

This level of qualification can include other qualifications as required locally.

4.8 Deicing Checker, DI-L50

This level of qualification includes:

The contamination check (check for the need to deice the aircraft)

The post deicing checks (only required if the deicing crew does not perform the post deicing check).

4.9 Deicing Coordinator, DI-L60

The deicing coordinator qualification entitles the person to coordinate and manage the deicing operation and/or work as a team leader.

This qualification is intended for coordinating deicing operations mainly at remote and/or centralized deicing facility areas or for other similar/anti-icing coordination functions at an airport.

Where **different naming terms (e.g., "Iceman," etc.)** are used locally, they must always be referred back to this qualification in local documentation.

4.10 Communicator, DI-L70

This task is identified particularly for companies using a person, identified by the company to transfer the de/anti-icing information between the flightcrew and the deicing crew when local deicing staff are unable to communicate in the English language with the flightcrew. The individual must receive annual deicing training to stay current for the task of communication in deicing operations.

4.11 Additional Qualifications and Roles Support/Ancillary

There may be other tasks and roles that are in use locally and/or these tasks may be part of another qualification. However, if they are performed independently, they also require proper training. There may be other tasks in use locally, not identified here. Anyone performing a task relating to deicing must have the proper training to perform that role safely.

NOTE: For the *basic* knowledge requirements of DI-L80 to DI-L140, consult Table 2.

4.12 Fluid Quality Control Inspector (**Laboratory Staff**), DI-L80

This qualification (laboratory staff, fluid field testing staff, fluid delivery testing staff) covers fluid quality control. This includes International standards and auditing requirements regarding fluid quality and specific fluid brand procedures.

4.13 Fluid Quality Control Inspector (**Non-Laboratory Staff**) DI-L90

Non-laboratory staff who handle fluid quality in any way (delivery testing, field testing, etc.) must have appropriate training for quality checks and procedure. Both theoretical and practical training is required.

The qualification for both levels comprises theoretical instruction and a written exam. Any new fluid or procedural requirements need special attention.

4.14 Deicing Instructor, DI-L100

For the purposes of this standard the terms “theoretical” instructor (TI) and “practical” instructor (PI) will be applied. This essentially separates theory teaching and practical training but there are many instructors who combine and provide both types of training. All the following description and Table 2 shall apply to both types of instructor.

Training shall be conducted by personnel who have demonstrated competence in the deicing subjects to be instructed and who have the skills to deliver the training effectively.

The instructor shall have:

1. Proper training in instructional methods
2. Sufficient knowledge of the training subject (e.g., aircraft critical areas and systems, fluid types, deicing vehicles, etc.). Knowledge of the English language and be able to read AS6285 and AS6286.
3. It is also recommended that the instructor attends or performs practical training and deicing of an aircraft on an annual basis in order to maintain necessary experience and knowledge.

Where specialists in a related field (e.g., a meteorologist, air traffic control staff, etc.) are used as subject matter experts (SME) for a particular subject, they do not need to be qualified in deicing and will not be classed as deicing instructors.

The training for deicing instructors should be considered to be held as a separate session. The length of this training may be adjusted according to local demands.

The deicing instructor is qualified to assess any demonstration of skill where needed. The qualification comprises theoretical instruction with a written exam.

4.15 Deicing Auditor, DI-L110

This task can be an internal role for company self-monitoring/auditing of deicing and/or used as an external auditor role for auditing companies for e.g., back-up deicing.

It is up to the company to set basic requirements for auditing skills. Refer to AS6332 and ARP8831 for guidance.

The auditor must have basic deicing knowledge to be able to inspect the deicing operation (not as a specific qualification) **and should remain current with regulatory, industry and company document/standards updates.**

This task is a nomination by the company and it is highly recommended to receive deicing training annually to stay current for the task of auditing deicing operations.

4.16 Head of Deicing Training (HODT), DI-L120

The HODT is a management appointment with no training course. The appointment is a matter of management confidence and is not quantifiable.

Consultants/contractors can also be employed to fulfil this task/role.

Requirements for the position:

- Sufficient knowledge in deicing operations and training to be qualified for this position.
 - a. **Where the HODT functions as an instructor**, previous experience of deicing and annual requalification (as DI-L100) **is required**.
 - b. If **not** functioning as an instructor, previous instructor training and annual recurrent instructor training are **strongly** recommended in order to have sufficient background knowledge for the role (particularly briefing other instructors).
- Must be reappointed each year by management with appropriate documentation. A document with an automatic self-renewal date is acceptable, i.e., a new, redated document is not required every year if the same person is continuously appointed.
- Previous deicing experience is strongly recommended.

Responsibilities:

1. Production of the deicing training program, review, and approval of all training material.
2. Briefing all the company trainers on industry updates and the training program.
3. Staying current with industry and document/standards updates and briefing other instructors on these.

(While DI-L120 is **not** a qualification, the knowledge requirements are included in Table 1 for clarity)

4.17 Flightcrew (Winter Operations), DI-L130 (Recommended)

The flightcrew is not normally engaged in daily ground deicing procedures but knowledge of the process should be in place. The flightcrew may have their own company training regarding winter operations. This training should cover all relevant aspects of the ground deicing process. This is an important factor in order to be able to communicate with the ground crew about proper treatment procedures and to have sufficient general knowledge of these subjects. The person responsible for deicing training for flightcrews should agree and verify the training with the HODT. The qualification comprises theoretical instruction with a written exam.

4.18 Cabin Crew (Icing Awareness), DI-L140 (Recommended)

Cabin crews are required to have training in the awareness of the effects of frozen surface contaminants and the need to inform the flightcrew of any observed surface contamination. The cabin crew is not normally engaged in daily deicing procedures but an awareness of the process should be in place. The cabin crew may have their own company training regarding winter operations. The ability to identify icing on an aircraft is an important factor in order to be able to communicate with the flight crew about any ice contamination before and during flight.

5. TRAINING SUBJECTS AND THEIR FIT WITH DEICING ROLES

5.1 Recommended Elements of Deicing Training

The elements listed here are for use as a reference only. It is up to the individual instructors to give each and every one of the deicing operations the relevant instruction which can be based on the following subjects. These subjects shall be explained and understood according to the level of importance that each operation demands. The recommended area of operation may differ between regions, and it is thus important that the instructor notes local requirements and selects the level of instruction accordingly. Depending on the qualification being trained, the listed subjects are intended to be introduced during training but not necessarily mastered in some cases, as some elements can be for general knowledge.

In order to obtain an overview of the essential aspects of deicing, there are several elements that need to be appreciated. These include:

- The requirement for deicing
- The practical methodology for aircraft treatment with deicing fluids
- Special aspects of deicing
- Communication and pre/post deicing check procedures

While each of these areas can be expanded into further topics to discuss, these broad headings show the flow of what must be taught. Firstly, there needs to be an appreciation of why aircraft deicing is vital and the regulatory requirements in place to reinforce this. Secondly, while there are a number of techniques available for aircraft deicing, by far the most common method is the use of fluids, which is also the only way to provide anti-icing. Lastly, there are a number of precautions, restrictions, and a need to learn from both any newer standards and guidance, plus findings from operational events and audits to enable continual improvement of the operations to take place.

5.2 The Fit Between the Recommended Elements of Deicing Training and the Deicing Roles

Tables 1 and 2 show the fit between a more detailed list of deicing aspects and the operational roles outlined in Section 4. However, it should also be appreciated that outside of the operational roles listed in the table, there are two other roles which will be involved.

- Senior management team: As this team has the accountability for the overall operation of the airport and aircraft safety, there is a requirement to ensure that there is up-to-date guidance, regulatory understanding, and operational learning embedded in the planning from winter to winter and is reflected in appropriate procedures and training programs.
- Head of Deicing Training: This person shall ensure awareness of any need for updating both their own skills plus any theoretical and practical training for all of the other roles in the organization.
- The different training subjects required to obtain the different functions are often the same. The differentiation will be made by adapting the duration of the training subject to the specific needs of the function.

Table 1 - Fit between recommended elements of deicing training and deicing roles
Operational - Basic elements for training courses

See local rules (final row). These may add to the course elements.

Recommended elements for training	Deicing (DI-L) qualification level reference						
	L10	L20	L30	L40	L50	L60	L70
A. The requirement for aircraft ground deicing							
Basic knowledge of aircraft performance		X		X	X	X	
Effects of frozen contamination on aircraft performance		X		X	X	X	
The clean aircraft concept, regulations, and recommendations	X	X		X	X	X	X
Meteorological considerations on ice formation		X		X	X	X	
B. The methods for checking the aircraft for contamination							
Contamination check (to establish the need for deicing)		X		X	X	X	
Post deicing/anti-icing check		X		X	X	X	
C. The practical methods for aircraft treatment with deicing fluids							
General techniques for removing frozen deposits from aircraft surfaces		X		X		X	
Deicing and anti-icing by fluids - procedures in general	X	X		X	X	X	X
Basic characteristics of aircraft deicing and anti-icing fluids		X		X		X	
Types of fluid checks required and the equipment for this		X		X	X	X	X
Deicing equipment operating procedures	X	X				X	
Fluid application and the use plus the limitations of holdover timetables (HOT)		X		X		X	X
Communication procedures and deicing/anti-icing code	X	X		X	X	X	X
Aircraft in general and common critical areas of surfaces and instruments	X	X		X	X	X	X
D. Special aspects of aircraft deicing operations							
Safety precautions and human factors	X	X	X	X	X	X	X
Environmental impact and mitigation	X	X	X	X	X	X	X
Deicing facility operation	X	X		X	X	X	X
Learning from season operations, audit findings and updated standards for next season	X	X	X	X	X	X	X
Engine contamination removal techniques			X				
Local rules/restrictions and airport procedures #	X	X	X	X	X	X	X

#Local rules and restrictions: Where relevant, local procedures shall be taken into account and emphasized more than others in local documentation. Compliance with this standard can only be shown if full compliance with the qualification requirements is fulfilled, as described here, and "read-across" must be shown in local documentation, including where training is not required by off-site or outside resources.

#Some operations will combine several functions in one person – this is acceptable but must be referred back to this standard.

Table 1A - DI-L Substitution chart: AS6286D to AS6286E

AS6286D		AS6286E	
		Table 1	
DI-L10		DI-L10	Deicing Vehicle Driver
DI-L20		DI-L20	Deicing Operator
	NEW	DI-L30	Engine Contamination Removal Personnel
DI-L30		DI-L40	Deicing Supervisor
DI-L30B		DI-L50	Deicing Checker
DI-L50		DI-L60	Deicing Coordinator
	NEW	DI-L70	Communicator
		Table 2	
	NEW	DI-L80	Fluid Quality Inspector (laboratory staff)
	NEW	DI-L90	Fluid Quality Inspector (non-laboratory staff)
DI-L40		DI-L100	Deicing Instructor
	NEW	DI-L110	Deicing Auditor
DI-L70		DI-L120	Head of Deicing Training
DI-L80		DI-L130	Flightcrew (winter operations) (basics of deicing)
DI-L80B		DI-L140	Aircrew (winter operations) (basics of deicing)

**Table 2 - Fit between recommended elements of deicing training and deicing roles
Support/Ancillary - Basic elements for training courses**

See local rules (final row). These may add to the course elements.

Recommended elements for training	Deicing (DI-L) qualification level reference						
	L80	L90	L100	L110	L120	L130	L140
A. The requirement for aircraft ground deicing							
Basic knowledge of aircraft performance			X	X	X		
Effects of frozen contamination on aircraft performance			X	X	X	X	
The clean aircraft concept, regulations, and recommendations	X	X	X	X	X	X	X
Meteorological considerations on ice formation			X	X	X	X	X
B. The methods for checking the aircraft for contamination							
Contamination check (to establish the need for deicing)			X	X	X	X	X
Postdeicing and or anti-icing check			X	X	X	X	X
C. The practical methods for aircraft treatment with deicing and anti-icing fluids							
General techniques for removing frozen deposits from aircraft surfaces			X	X	X	X	
Deicing and anti-icing by fluids - procedures in general			X	X	X	X	
Basic characteristics of aircraft deicing and anti-icing fluids	X	X	X	X	X	X	
Types of fluid checks required and the equipment for this. AS6285 para.4.3.1 & 2	X	X	X	X	X	X	
Deicing equipment operating procedures			X	X	X		
Fluid application and the use, plus the limitations, of holdover timetables (HOT)			X	X	X	X	
Communication procedures and deicing/anti-icing code			X	X	X	X	
Aircraft in general and common critical areas of surfaces and instruments			X	X	X	X	X
D. Special aspects of aircraft deicing operations							
Safety precautions and human factors	X	X	X	X	X	X	
Environmental impact and mitigation	X	X	X	X	X	X	
Deicing facility operation			X	X	X	X	
Learning from season operations, audit findings and updated standards for next season	X	X	X	X	X	X	
Local rules/restrictions and airport procedures #	X	X	X	X	X	X	

6. TRAINING AND QUALIFICATION PROCESS

6.1 Initial and Annual Recurrent Deicing Training and Qualification

Only trained and qualified personnel shall carry out aircraft ground deicing procedures. Theoretical and practical skills training shall be conducted by qualified instructors/trainers who have demonstrated the skills to deliver the training and who have competence (knowledge, skill, and experience) in the subjects to be instructed. Initial assessment shall be conducted by a qualified instructor/trainer who has appropriate knowledge, skills, and experience in the functions being assessed. If additional evaluation(s) is required, a nominated individual/trainer, with the necessary experience and qualification, can be appointed to oversee the repetitive live or simulated deicing performance.

Training shall be a combination of theoretical (suitable and sufficient information and instruction relating to the topic being trained) and practical skills training to verify the trainees' understanding of, and ability to complete, the task being trained. Changes to methods and processes shall be communicated to relevant personnel, and additional information and training shall be delivered as appropriate. It is recommended that training is divided into different groups according to levels of qualification and operational expertise. Companies providing deicing services shall have both a qualification program and a quality control program to monitor and maintain the level of competence. Practical training and assessment, and demonstration of skills where applicable, for ground crew personnel shall be performed as part of a ground crew training and qualification program.

Deicing training is divided into initial and annual recurrent training to ensure that all personnel obtain and retain a thorough knowledge of aircraft ground deicing policies and procedures, including new procedures and lessons learned. Training programs must include a detailed description of initial and annual recurrent training and qualification concerning the specific requirements of the program and the duties, responsibilities, and functions detailed in the program. An ongoing review plan is advisable to evaluate the effectiveness of the deicing training received.

Initial training shall include:

- Theoretical training
- Theoretical examination
- Practical training
- Practical assessment (according to qualification level requirements)

Initial training qualification is achieved upon successful completion of theoretical training (including a written examination) and practical training (including practical assessment according to qualification level requirements).

The practical assessment shall be accomplished by at least one of the following:

1. On live aircraft during live deicing operations – recommended/preferred method
2. By spraying on a mock-up surface/aircraft or deicing simulators that would simulate an actual live deicing operation

Further evaluations may be performed as applicable for the local demands and/or company requirements in order to achieve initial training qualification and this shall be defined within training programs. These requirements should be based on the extent of the deicing operation locally, taking into account aspects such as:

- Most common Winter climate
- Type of fluid used
- Frequency of deicing
- Where deicing operations take place (on-gate, remote, CDF)
- Range of aircraft types
- Range of deicing vehicle types

Annual recurrent training shall include:

- Theoretical training
- Theoretical examination
- Practical training
- Practical assessment (where new equipment or operational methods are utilized)

If there are no changes to equipment or operational methods, a practical evaluation and demonstration of skills is recommended.

Annual recurrent training qualification is achieved upon successful completion of theoretical training (including a written examination) and practical training. Practical assessment is performed where applicable (where new equipment or operational methods are utilized).

6.2 Theoretical Elements - Standard Teaching Plan

From Tables 1 and 2 in Section 5, it is evident that there are a number of areas under each heading that can be taught as separate modules. This allows the personnel who may need to appreciate the different aspects of deicing to only need to be involved in their relevant subjects. Tables 3 and 4 offer guidance on how sessions may be run. Reference is made to the appropriate documents to support each session.

Table 3 - Theoretical elements - standard teaching plan (sections A, B, and C)

Subject	Guidance Content (References)
Course Introduction (AS6286)	
TE1. Introduction	Trainer to introduce themselves. They will explain how they are qualified to train the subject, plus their experience. They will give an overview of the course content, the teaching method, and the requirement for a validation exam and pass mark
A. The requirement for deicing (AS6286 Appendix A)	
TE2. Basic knowledge of aircraft performance	Four forces that act on an aircraft. Airflow over and under the wings. Why an aircraft can take off. How lift is generated. The critical angle of attack. The aerodynamic window of operation. The biggest contributor to aircraft lift.
TE3. Effects of frozen contamination on aircraft performance	The effect of frozen contamination on lift and drag and the aerodynamic window of operation. The critical component areas for lift and maneuverability of the aircraft. The effect of a small layer of frost. Other effects of frozen contamination.
TE4. The clean aircraft concept, regulations, and recommendations	The "clean aircraft" concept. The regulatory requirements of various national authorities. The role of SAE International and the key global deicing standards. The main purpose of aircraft deicing and anti-icing.
TE5. Meteorological considerations on ice formation	General weather conditions and ice formation. Typical weather types, leading to frozen contamination on the aircraft. Weather situations needing special attention. Weather conditions included in/excluded from the holdover guidelines. Some forms of weather reporting. Effects of weather on airport operation.
B. The methods for checking the aircraft for contamination	
TE6. Contamination check (to establish the need for deicing)	How to examine the aircraft critical flight surfaces (wings, vertical stabilizer, horizontal stabilizers), top fuselage, undercarriage, nose radome, pitot-static orifices, angle of attack devices, windshields.
TE7. Postdeicing check	How to perform a postdeicing check of the aircraft to make sure that no contamination (frozen deposits) remains after deice/anti-ice, the aircraft is clean and in proper condition for flight.
C. The practical methods for aircraft cleaning with deicing fluids (ARP1971, AS6285)	
TE8. General techniques for removing frozen deposits from aircraft surfaces	The various ways in which deicing can be carried out. The only way in which anti-icing can be carried out. The need to prepare equipment, procedures, and people. The areas of an aircraft to check for frozen contamination. Descriptions of one-step and two-step deicing.
TE9. Deicing by fluids - procedures in general	Critical aspects of deicing and the general process. Special care for composite wing deicing. The general process for using anti-icing fluids effectively. Use of Type I for anti-icing. The general use of Type II, III, and IV fluids.
TE10. Basic characteristics of aircraft deicing fluids	Why deicing fluids are the most usual way of deicing aircraft. The three safety requirements of deicing fluids. The differences between Type I, II, III, and IV fluids, and the colors of these. The unusual characteristics of anti-icing fluids and the precautions needed. The two ways to classify fluid performance. Incompatibility of certain types of fluids, e.g., EG & PG are not compatible with acetate or formate based fluids. Understanding of AMS1424/1 & /2 and AMS1428/1 & /2 and what is allowed to be applied to the aircraft per the manufacturer's Aircraft Maintenance Manual.
TE11. Types of fluid checks required and the equipment for this	The general handling and storage requirements of deicing fluids. The quality control checks to be performed on these fluids. Pumping, heating, and storage tank requirements.
TE12. Deicing equipment operating procedures	The variations of deicing vehicles, and the types of safety precautions to be taken. The operation of filling stations. Clear communications with the flightcrew. Equipment use, spray alternatives, and data collection. Basic vehicle components and safety equipment. Refer to ARP1971.
TE13. Fluid application and the use plus the limitations of holdover guidelines	Details of the "clean aircraft" concept. The main areas of the aircraft to treat. The key aircraft areas to anti-ice. The purpose of holdover timetables (HOT) and how to read these. The difference between generic and fluid brand HOT tables. The importance of using the correct dilution when reading the appropriate HOT table.
TE14. Deicing codes and communication procedures	The anti-icing code/post deicing report. Communication to flightcrew with reference to AS6285 . Operator/driver communication, two-way communication.
TE15. Aircraft in general and common critical surfaces and instruments	The critical aircraft surfaces to inspect. The precautions to take against clear ice. Critical areas not to treat. Understanding the use of the "no spray" diagrams in AIR8468.

Table 4 - Theoretical elements - standard teaching plan (section D)

Subject	Guidance Content	Reference
D. Special aspects of aircraft deicing operations (ARP5660, AS6332, AIR8468)		
TE16. Safety precautions and human factors	Safety assessment by hazard identification and risk management. Personal safety (contamination, working at height, etc.). Safety of others (contamination, struck by vehicle, etc.). Aircraft safety (damage prevention). Personal Protective Equipment (gloves, visors, clothing, etc.).	
TE17. Environmental impact and mitigation	Environmental impact and mitigation.	
TE18. Deicing facility operation	The need for special procedures for central deicing facilities and remote deicing facilities with reference to ARP5660 .	
TE19. Learning from season operations, audit findings, and updated procedures.	Review of season operational performance with reference to AS6332 . Review of any incidents, both local and in the industry. Review findings from internal and external audits as appropriate. Consolidate learning with updates to procedures and instructions for next winter season.	
TE20. Local rules and restrictions, airport procedures	Local procedures, permits, requirements, documentation, and operations. Compliance with all SAE Standards referenced.	

6.3 Theoretical Elements - Examination Process

The examination process contains a theoretical exam, for which a minimum passing score of 75% shall be required. The practical part (where applicable) only contains a pass/fail determination. Since 75% is a passing score for the theoretical part, this means that up to 25% may still be misunderstood. This “gap” shall be noted and wrong answers corrected with the trainee such that 100% understanding is achieved in order to secure a safe deicing operation. The written exam can be performed as an open-book exam so that pertinent holdover guidelines and other data sources such as refractive index tables can be referenced. Normal deicing procedures should be basic knowledge, so there should not be any material available during the test explaining these subjects.

The examination for any particular course should be built so that all relevant subjects are covered by the questions. The level of difficulty per question should reflect the level of qualification and the relevance of the subject for that particular qualification. As a rule of thumb, a minimum of one question per subject relating to the qualification level should be included in the written exam. The minimum number of questions shall reflect the qualification level and may vary accordingly. However, this minimum amount should not be less than 15 questions (starting with the least demanding level of qualification/training hours). The theoretical examination shall be in accordance with national requirements and/or local regulations. The questions should be multiple choice containing a minimum of three possible answers per question. If there are differing procedures from normal deicing operations, then written answers can be used to explain this. The exam questions shall be periodically reviewed and updated to cover all current standards and regulations.

The Head of Deicing Training shall include the following elements in the training program:

- The questions should always be based on facts and not perceptions
- The question should not be misleading and should be clearly written such that it is not possible for it to be incorrectly interpreted
- Misinterpretations may lead to remembering the subject in an incorrect way
- The question series should cover all aspects of operation and include the local arrangements (if any)
- Evaluation should include oral quizzing where practical items are covered (e.g., reading holdover timetables and/or refractive index limits, etc.)

6.4 Practical Elements - Standard Teaching Plan

Upon the successful completion of the theoretical part of the training, practical training will need to be carried out at the airport. A standard teaching plan for this part of the training is shown in Tables 5 and 6. The following points shall be noted:

- The teaching plan shows most of the elements expected for practical hands-on training. However, this must also be subject to local management guidance, requirements, and resources.
- All elements in Tables 5 and 6 are applicable to DI-L10, DI-L20, DI-L100, and DI-L120. Any exceptions to this are noted in the appropriate element. These exceptions are noted for DI-L40, DI-L50, DI-L60, and DI-L80/90.
- Most of the operations below require the use of a suitable deicing truck and aircraft.
- The timescale for most of these elements is open - to allow for the development of the required level of skill for the trainee.

Table 5 - Practical elements - standard teaching plan, Part 1 of 2

Element		Content
PE1	Overview of deicing equipment and its operation plus facilities (e.g., storage tanks)	Deicing equipment, vehicle description (type, make, nozzles, guns, tanks, etc.). Vehicle operation. Safety features. Manual versus proportional mixing. Facilities. Storage requirements. Filling. Heating equipment (as applicable for engine ice removal).
PE2	Cab layout and operation	Pre-operation checks. Seat and mirror adjustment. Gear shift selection. Park brake. Heater and pump controls. Boom controls (if fitted). Communication and connections (headset). Start and stop procedures. Driving controls (wipers, lights, and indicators, etc.).
PE3	Deicing unit control panel	Start/restart/stop. Emergency stop procedures. System indicators. Switches.
PE4	Basket operation	Emergency stop procedures. Emergency boom lowering procedures. Harness attachment point(s) and harness use. Communications and connections (headset). Light switch operations. Pump delivery selection/pump override/pump operation. Anti-ice/deice and snow gun operation. Boom controls. Extend/retract/raise/lower/rotate. Personal Protective Equipment.
PE5	Auxiliary engine operation (if fitted)	Start/restart/stop/emergency stop procedures. Manual accelerator control. Fire extinguisher operation.
PE6	Fluid heater operation (if fitted)	Start/Shut down procedures. High flame/low flame indicators. No flow indicator. Low fluid indicator. Pump pressure gauge.
PE7	Ground hose operation	Position of hose. Operation of ground gun. Fluid flow rate.
PE8	Pre-treatment checks	All doors/hatches closed. All personnel clear. Aircraft configuration.
PE9	Communication (also, DI-L40, DI-L50, and DI-L60)	Communication with Flight Deck. Engineering (i.e., Aircraft Configuration). Anti-icing code/Post deicing report. Communication between driver and sprayer. Multiple vehicle operations, vehicle to vehicle Centralized operation. Coordination.
PE10	Vehicle positioning	Optimum positioning for spraying. Communication with operative. Driving safely around the aircraft.

Table 6 - Practical elements - standard teaching plan, Part 2 of 2

Element		Content
PE11	Vehicle safety around aircraft	Approaching aircraft (i.e., engines/anti-collision lights). Vehicle brake check. Vehicle height. Vehicle speed. Awareness of other ramp users. Accident/Incident reporting and safety reporting.
PE12	Fluid Spraying	Critical surfaces. No-spray areas. Fluid temperature. Spraying distance (heat retention). Spray patterns (nozzle settings).
PE13	Other de/anti-icing procedures (also, DI-L50)	Pre-deicing treatment. Local frost prevention. Deicing engines, sensors, probes, etc. Related checks.
PE14	Driving the deicing truck	Maneuvering the vehicle. Handling characteristics. Emergency situations. Fault situation.
PE15	Deicing scenarios (where applicable)	Gate deicing. Remote/centralized deicing. Multiple vehicle deicing.
PE16	Emergency situations (clarify theoretical elements in practice) (also DI-L40)	Safety at work. Collisions and other accidents. Procedures and situations. Human Factor situations. Environmental control.
PE17	Quality checks (if applicable) (also, DI-L80/90)	Fluids, limits, and reporting. Sampling. Measurement instruments and use. Filling station, fluid quality. Fluid delivery.
PE18	Contamination check (also, DI-L40 and DI-L50)	Different contaminations on the aircraft. Aircraft types. Clear ice checks, tactile check. Reporting/communication. Final release, anti-icing code. Safety elements, human factors.
PE19	Spraying and using hot air (practice as needed) (also DI-L40)	Fuselage, underwing, wing, and tail. Engine and propeller ice. Landing gear instruments.
PE20	Practical Assessment	Each trainee shall be able to demonstrate competence in: 1. Driving/positioning equipment/quality control and fluid handling/communication/reporting and/or Spraying (as applicable)/pre-post check. 2. Trainees shall also be tested on the operation of the vehicle, in particular, safety aspects and features (as applicable). 3. Actual deicing operations on an aircraft or on a mock-up surface/aircraft or deicing simulator (as applicable). This shall also be evaluated over a period of time (i.e., events), as applicable. 4. A verbal assessment of things learned during training shall be performed.

6.5 Practical Elements - Assessment Process

A practical assessment shall be performed as applicable for qualification to be achieved. Details of the conditions in which the practical assessment shall be performed can be found in 6.1. Further evaluations may be performed as applicable for the local demands and/or company requirements. The practical assessment shall include a verbal assessment of the trained theoretical topics, as well as the practical parts trained. In order to have an “independent” evaluation, it is recommended that the assessment be performed by another qualified instructor rather than the instructor who has trained the trainee. The parts to be covered during the practical assessment shall include all of the material for the qualification level at hand. These are to demonstrate competence in (as applicable):

- Driving vehicles
- Positioning equipment
- Quality control and fluid handling
- Contamination check
- Postdeicing check or Postdeicing/anti-icing check
- Communication
- Reporting and documentation
- Spraying
- No spray areas
- Local operational requirements

The trainees shall also be tested on the operation of the vehicle, in particular, its safety aspects and features. The practical assessment should focus on the most common operational aspects that are locally experienced, e.g., typical aircraft at the station and typical deicing operations. The training syllabus under 6.4 describes the practical training in more detail, and the assessment shall reflect those parts that were trained.

It is recognized that snow and ice conditions for training cannot be controlled and may not occur for training purposes. Suitable simulation training needs to be available to cover this and the training course should be capable of providing this.

6.6 Training System and Records

6.6.1 Training System and Renewal

All training should be performed according to a pre-established training program. This program should include all levels of training and their relevant requirements. The theoretical part should be categorized according to the qualification, thus dividing the training sessions from each other. This training program will easily identify what course is leading to which qualification. This numbering system presented here does not need to be the same for every company but is a logical sequence to follow if desired. To remain qualified to perform certain deicing duties, annual recurrent training is required. An annual recurrent course should be presented as a training session that renews previous qualifications. This recurrent training does not have to be performed exactly or before the date of the previous qualification. A prior year's qualification remains valid for the beginning of the next deicing season but must be renewed before the year's end.

As an example: If a trainee was qualified on November 1, 2015, the qualification renewal shall be completed between November 1 and December 31, 2016. This date-range flexibility eases the burden of training large groups at the beginning of the deicing season. However, it is highly recommended that the training be performed as early in the season as practicable. Conducting training sessions before the beginning of the season is also an option for theoretical aspects.

Local regulation could overrule the end-of-year requirement.

NOTE: Initial and recurrent training courses:

Management (of the trainee's company) is responsible for the level of competence of staff attending courses. If employees are competent through continuous activity in deicing, they only require "refresher" training. If employees have a lengthy absence from practical activities (e.g., no active deicing was performed for two consecutive seasons), they would normally require initial or requalification training.

6.6.2 Records

The training program shall have a tracking system that ensures all required personnel have been satisfactorily trained. Records of personnel training and qualification (see Figures 1 and 2) shall be maintained as proof of qualification. Where an individual has passed an examination but has not achieved a perfect grade, it is recommended that incorrect answers are reviewed with the individual to promote error-free learning.

Records shall be kept of all tests and scores, for both the theoretical exam and the practical assessment. A test record shall indicate the trainee, the qualification being sought, the date of the test, the evaluating instructor, and the score. A failed examination can be retaken, and this must be noted in the record. The evaluation process must lead to a qualification before the trainee shall be allowed to carry out the required role. Any restriction to a qualification shall be documented. A certificate should be given to the person to verify all training and qualifications. A copy of the certificate should be kept. All documentation for the current season should be kept easily at hand for verification by approved deicing staff. Records shall be retained in accordance with applicable timelines established by local regulatory, air operator, or organizational record retention requirements.

Attendance at training sessions shall be recorded and kept for verification of the qualifications of each person. Records of theoretical sessions and exams, as well as records of practical training, assessment, and training while working (where applicable), must be retained for each person qualified. The record shall clearly show that instruction has been given and received with signed documents (paper or electronic). A training schedule for each qualified person shall be maintained. The record shall identify the date when the particular subject matter was delivered to the trainee. The trainer shall sign or initial that the training has been delivered. The trainee shall, as an acknowledgement and understanding of the training, sign or initial the appropriate subject matter on the training record form. Training content and records shall be made available for review by an authorized air operator representative or regulatory authority. Where electronic or computer-based training record systems are maintained, the content shall include, as a minimum, the trainee's name, test mark achieved, date of training, and course reference. The same procedure shall be followed where contract deicing is used. Names, dates, and the scope of training must be clearly stated.

AIRCRAFT DEICING/ANTI-ICING TRAINING ROSTER

[illegible]