SAE INTERNATIONAL

AEROSPACE STANDARD

AS6285™

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Aircraft Ground Deicing/Anti-Icing Processes

RATIONALE

The purpose of this document is to provide industry standards for the methods and procedures used in performing the treatments necessary for the proper deicing and anti-icing of aircraft on the ground using AMS1424 and AMS1428 qualified fluids (Type I, II, III, and IV) and non-fluid methods.

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 surfaces and components. These contaminants can adversely affect aircraft performance, stability and control, and operation of mechanical devices such as control surfaces, sensors, flaps, and landing gear. If frozen deposits are present, other than those considered in the aircraft certification process, the performance of the aircraft may be compromised.

Regulations governing aircraft operations in icing conditions shall be followed. Specific rules for aircraft are set forth in the United States Federal Aviation Regulations (FAR), EASA EU-OPS, Canadian Aviation Regulations (CAR), and others. Paraphrased, these rules specify that no one may dispatch or take off an aircraft with frozen deposits on components of the aircraft that are critical to safe flight. A critical surface or component is one which could adversely affect the mechanical or aerodynamic function of an aircraft.

As individual icing situations or aircraft types and models may require special procedures, this document can never replace the aircraft operator's judgement. The responsibility for the correct deicing and anti-icing procedures for aircraft always rests with the operator of the aircraft.

The ultimate responsibility for the determination that the aircraft is clean and meets airworthiness requirements rests with the pilot in command of the aircraft.

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As6285 Aircraft Ground Deicing Anti Icing Processes Sae

United States. Federal Aviation Administration

As6285 Aircraft Ground Deicing Anti Icing Processes Sae:

Aircraft Ground Deicing/Anti-icing Quality Management G-12T Training and Quality Programs Committee,2017 This document establishes the general requirements for the quality management of aircraft ground deicing anti icing systems and processes It covers the areas of Quality system documentation and control of records Management responsibility Resource management Product realization and Measurement analysis and improvement This document defines these areas and their key aspects so they can be practically managed and that deicing operations can become safer with time In alignment with AS6285 and AS6286 the primary focus of this standard is on the deicing anti icing of aircraft using deicing and anti icing fluids This document provides industry standards and guidance for the management of quality systems and processes for the effective deicing and anti icing of aircraft on the ground It forms one part of three related SAE Aerospace Standards AS and should be read in conjunction with AS6285 Aircraft Ground Deicing Anti icing Processes and AS6286 Training and Qualification Program for Deicing Anti Icing of Aircraft on the Ground Collectively AS6285 AS6286 and AS6332 are known to the international community as the Globalized Aircraft Deicing Standards Exposure to weather conditions conducive to ice formation can cause the accumulation of frost snow slush and ice on aircraft surfaces and components These contaminants can adversely affect aircraft performance stability and control plus the operation of mechanical devices such as control surfaces sensors flaps and landing gear If frozen deposits are present other than those considered in the aircraft certification process the performance and safety of the aircraft may be compromised Regulations governing aircraft operations in ground icing conditions shall be followed ICAO Annex 6 Part I and Annex 14 Vol I mandate specific rules for the safe operation of aircraft during ground icing conditions and all member states subsequently are required to have regulations in place to ensure this Paraphrased these rules specify that no one may dispatch or take off an aircraft with frozen deposits on components of the aircraft that are critical to safe flight A critical surface or component is one which could adversely affect the mechanical or aerodynamic function of an aircraft The intent of these rules is to ensure that no one attempts to dispatch or operate an aircraft with frozen deposits adhering to any aircraft component critical to safe flight This is known as the clean aircraft concept Quality management concerns the establishment documentation implementation and maintenance of a system in order to deliver the required process outcome and to continually improve effectiveness Quality management is therefore a system that allows the effective delivery of the clean aircraft concept Although no system is perfect it is necessary to ensure the operation and processes evolve and learn from both non conforming practice and opportunities for improvement in this critical area of aircraft safety As individual icing situations or aircraft types and models may require special procedures this document can never replace the aircraft operator s judgement However it does give guidance on the principles of systematic operation of deicing and the improvements that allow valuable learning from operations to be captured for even greater assurance of safe operations Aircraft Ground Deicing/Anti-Icing Processes G-12M Methods

Committee,2023 This SAE Aerospace Standard AS establishes the minimum requirements for ground based aircraft deicing anti icing methods and procedures to ensure the safe operation of aircraft during icing conditions on the ground This document does not specify the requirements for particular aircraft models The application of the procedures specified in this document are intended to effectively remove and or prevent the accumulation of frost snow slush or ice contamination which can seriously affect the aerodynamic performance and or the controllability of an aircraft The principal method of treatment employed is the use of fluids qualified to AMS1424 Type I fluid and AMS1428 Type II III and IV fluids All guidelines referred to herein are applicable only in conjunction with the applicable documents Due to aerodynamic and other concerns the application of deicing anti icing fluids shall be carried out in compliance with engine and aircraft manufacturer s recommendations The purpose of this document is to provide industry standards for the methods and procedures used in performing the treatments necessary for the proper deicing and anti icing of aircraft on the ground using AMS1424 and AMS1428 qualified fluids Types I II III and IV and non fluid methods AS6285 forms one part of three related SAE Aerospace Standards AS and should be read in conjunction with AS6286 and AS6332 Collectively AS6285 AS6286 and AS6332 are known to the international community as the global aircraft deicing standards Exposure to weather conditions on the ground conducive to ice formation can cause the accumulation of frost snow slush or ice on aircraft surfaces and components These contaminants can adversely affect aircraft performance stability control and operation of mechanical devices such as control surfaces sensors flaps and landing gear If frozen deposits are present other than those considered in the aircraft certification process the performance of the aircraft may be compromised Regulations governing aircraft operations in icing conditions shall be followed Specific rules for aircraft are set forth in the United States Code of Federal Regulations 14 CFR EASA Operation Regulations EU OPS Canadian Aviation Regulations CAR and others Paraphrased these rules specify that no one may dispatch or takeoff an aircraft with frozen deposits on components of the aircraft that are critical to safe flight A critical surface or component is one which could adversely affect the mechanical or aerodynamic function of an aircraft In the event of differences or discrepancies in the requirements set out in this standard and any requirements set out in the domestic regulations applicable to the end user the domestic regulation requirements shall supersede those set out in this standard As individual icing situations or aircraft types and models may require special procedures this document can never replace the aircraft operator s judgement The responsibility for the correct deicing and anti icing procedures for aircraft always rests with the operator of the aircraft The ultimate responsibility for the determination that the aircraft is clean and meets airworthiness requirements rests with the pilot in command of the aircraft Changes in this revision E include aReorganized sections and edited titles Sections 4 5 6 7 and 8 bAdded definitions cReorganized aircraft components dAdded information on daily concentration tests eAdded information on glycol delivery methods fAmended of post deicing check after infrared deicing gIntroduced information about cold dry snow or ice crystals hAdded information in fluid related limits and application

guidelines iEdited caution statement about surface coatings and their effects on de anti icing fluids jReviewed and updated communication section kIntroduced recommended phraseology and references from ARP6257A *Aircraft Ground Deicing/Anti-Icing Communication Phraseology for Flightcrew and Groundcrew* G-12M Methods Committee,2022 This SAE Aerospace Recommended Practice ARP establishes standard phraseology for the communication procedures during aircraft ground deicing anti icing operations NOTE The minimum requirements to accomplish an aircraft deicing anti icing operation are specified in AS6285 Clear concise standard phraseology between the groundcrew and flightcrew is an important part of the deicing anti icing process It plays a key role in the overall safety of the deicing program Historically flightcrew and groundcrew have had to deal with differing communication scripts at multiple airport locations This has led to unsafe situations including aircraft moving before the deicing process has been fully completed A decision has been made by the SAE G 12 Methods Committee to incorporate ARP6257 into AS6285 Once adopted into AS6285 this document will be cancelled Ramp De-Icing G-12M Methods Committee,2018 This Technical Report has been declared CANCELLED as of June 2018 and has been superseded by AS6285 AS6286 and AS6332 By this action this document will remain listed in the respective index if applicable Cancelled Technical Reports are available from SAE Technical data and references in this document are superseded by technical data in AS6285 Aircraft Ground Deicing Anti Icing Processes AS6286 Training and Qualification Program for Deicing Anti icing of Aircraft on the Ground and AS6332 Aircraft Ground Deicing Anti icing Quality Management These three documents address the topics of aircraft ground de anti icing mentioned in AIR1335 and also reference specific SAE documents regarding de anti icing fluids holdover time and equipment This document is not fit for purpose due to extensive out of date information and practices The advice and practice in this document are deemed to be unsafe **Aircraft Ground Deicing/Anti-Icing Training and Qualification Program** G-12T Training and Quality Programs Committee,2023 This document establishes the minimum training and qualification requirements for ground based aircraft deicing anti icing 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 anti icing 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 This document provides the industry standards and guidance for the training and qualifying of staff plus the expected contents of this training for effective deicing and anti icing of aircraft on the ground AS6286 forms one part of three related SAE Aerospace Standards AS and should be read in conjunction with AS6285 and AS6332 Collectively AS6285 AS6286 and AS6332 are known to the International Community as the Global Aircraft Deicing

Standards The lead document is AS6285 which all the other documents support and should therefore be in agreement with Exposure to weather conditions conducive to ice formation can cause the accumulation of frost snow slush and ice on aircraft surfaces and components These contaminants can adversely affect aircraft performance and controllability In addition they can adversely affect the operation of mechanical devices such as control surfaces sensors flaps and landing gear If frozen deposits are present other than those accounted for in the aircraft certification process then the performance and safety of the aircraft will be compromised Regulations governing aircraft operations in ground 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 subsequently are required to have regulations in place to ensure conformance with these Paraphrased these rules specify that no one may dispatch or take off an aircraft with frozen deposits on components of the aircraft that are critical to safe flight A critical surface or component is one which could adversely affect the mechanical or aerodynamic function of an aircraft The intent of these rules is to ensure that no one attempts to dispatch or operate an aircraft with frozen deposits adhering to any aircraft component critical to safe flight This is known as the Clean Aircraft concept This document specifies the standards for training and qualifying staff plus the expected contents of their training It provides guidance for the setting up of a proper training and qualification program for the deicing and anti icing of aircraft on the ground Although references are made to the other two global standards some background information to support a training program is provided to make the material a better tool for the preparation and execution of the training and qualification process Standard teaching plans and a practical assessment method are included This material was compiled using various international documents with support from SAE standards and individually contributed editorial comments Its purpose is to serve as a global deicing training manual In addition each organization involved in aircraft ground deicing and anti icing is responsible for complying with local regulations and requirements imposed by manufacturers of aircraft equipment and fluids in addition to regulatory and environmental authorities Changes made are 1Operational Levels of Training and Qualification reverted to Revision B 2Amendments and corrections arising from first ballot Jan 2020 comments 3Removal of Appendix B entire to the Manual of Ancillary Deicing and Anti icing Information 4Removal of Tables B1 and B2 To G12 Methods Working Group Minimum Fluid Quantities 5Appendix C now becomes Appendix B **Aircraft Deicing/Anti-Icing Methods** G-12M Methods Committee,2017 This document establishes the minimum requirements for ground based aircraft deicing anti icing Methods and procedures to ensure the safe operation of aircraft during icing conditions This document does not specify requirements for particular airplane models NOTE Particular airline or aircraft manufacturers published manuals procedures or methods supplement the information contained in this document This document is cancelled and superseded by AS6285 AircraftGround De Anti Icing Processes p Technical data in this document is superseded by technical datain AS6285 AS6285 was developed as a global deicing standard withthe intent

of replacing the recommended practices in this documentas well as encompassing additional topics needed to specify thecomplete de anti icing process AS6285 is technically superior toARP4737 Technical data in this document is no longer current Use ofthis document will lead to unsafe practices as well as confusionwhen third parties provide aircraft de anti icing services **Large Aircraft Ground Deicing** United States. Federal Aviation Administration,1992 This advisory circular AC contains recommendations for ensuring the safe operation of large airplanes during icing conditions and guidelines for the development of adequate procedures for the deicing of large airplanes **Methods and Processes for Evaluation of Aerodynamic Effects of SAE-Qualified Aircraft Ground Deicing/Anti-Icing Fluids** G-12ADF Aircraft Deicing Fluids,2018 This document describes methods that are known to have been used by aircraft manufacturers to evaluate aircraft aerodynamic performance and handling effects following application of aircraft ground deicing anti icing fluids fluids as well as methods under development Guidance and insight based upon those experiences are provided including Similarity analyses Icing wind tunnel tests Flight tests Computational fluid dynamics and other numerical analysesThis document also describes The history of evaluation of the aerodynamic effects of fluids The effects of fluids on aircraft aerodynamics The testing for aerodynamic acceptability of fluids for SAE and regulatory qualification performed in accordance with AS5900 Additionally Appendices A to E present individual aircraft manufacturers histories and methodologies which substantially contributed to the improvement of knowledge and processes for the evaluation of fluid aerodynamic effects The document has been revised to include a note in 4 4 2 presenting one scenario where a diluted fluid could be used to perform flight tests References to ARP4737 were replaced by AS6285 since the former was cancelled Publications AMS1428 1 and AMS1428 2 were included in the list of references Editorial and formatting improvements were also incorporated **Ground Deicing and Anti-icing Program** United States. Federal Aviation Administration,1994 **Aircraft Ground De/Anti-Icing Communication Phraseology for Flight and Ground Crews** G-12M Methods Committee,2016 This document establishes standard phraseology for the communication procedures during aircraft ground deicing operations NOTE The minimum requirements to accomplish an aircraft deicing operation are specified in the AS6285 document Aircraft deicing operations traditionally occurred at the passenger gate or cargo ramp While this is still predominantly the case many airports are maximizing aircraft parking space efficiency or have local environmental requirements that necessitate the use of remote or centralized deicing locations Deicing services at these locations may be provided by a single airline or third party specialist company resulting in cross company procedures being implemented for site safety or efficiency purposes Standardized aircraft deicing communication protocols and phraseology are needed to ensure that important safety quality and efficiency information exchange occurs between the participating flight and ground crews **Advisory Circular** United States. Federal Aviation Administration,19?? **Ground Deicing and Anti-icing Training and Checking** United States. Federal Aviation Administration,1994 **AIRCRAFT DEICING/ANTI-ICING METHODS WITH FLUIDS, FOR LARGE**

TRANSPORT AIRCRAFT G-12M Methods Committee,1992 This document provides information to assist in the preparation of particular airline aircraft ground deicing anti icing procedures and to ensure safe operation of large transport aircraft during adverse conditions conducive to aircraft icing on the ground in accordance with aircraft manufacturers recommendations *Equipment* G-12T Training and Quality Programs Committee,2016 This document shall be used in conjunction with AS6286 Training and Qualification Program for Deicing Anti icing of Aircraft on the Ground AS6286 1 Methods AS6286 3 Fluids AS6286 4 Weather AS6286 5 Health Safety and First Aid AS6286 6 Aircraft Deicing Anti icing Diagrams No Spray Zones This document covers the standards for training and qualifying staff related to the different aspects of Deicing Anti icing operations In conjunction with the main document AS6286 and other related slash sheets it will provide and qualification standards to set up a proper training and qualification program to deice and anti ice aircraft on the ground Information to support this training program is provided to make the material a better tool for the preparation and execution of the training and qualification It is intended to provide a common basis for deicing anti icing training and qualification for de icing providers and airlines This material was compiled using various international documents with support from SAE documents and individually contributed editorial comments Its purpose is to serve as a Globalized Deicing Training Manual The document is intended to promote and develop safe practices effective procedures and improved technology related to training of aircraft ground operations in winter conditions to ensure the highest possible levels of safety for passengers flight crew and ground personnel It shall ensure continued compliance with all relevant standards and regulatory requirements and shall ensure that it continues to reflect current industry best practice It shall contribute to develop training standards and specifications related to the deicing anti icing of aircraft on the ground in conjunction with international standards organizations The document shall support the preparation of training material for aircraft ground deicing anti icing purposes harmonized with other organizations in the aircraft ground deicing anti icing field for example SAE ISO IATA ICAO and regulatory authorities **Training and Qualification Program for Deicing/Anti-icing of Aircraft on the Ground** G-12T Training and Quality Programs Committee,2016 This document establishes the minimum training and qualification requirements for ground based aircraft deicing anti icing 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 anti icing 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 the level and length of training should therefore be adjusted accordingly However the minimum level of training shall be covered in all cases As a rule of thumb each hour of classroom training should at least equal the same amount or include more of practical training wherever this is relevant Both basic and recurrent practical training shall be performed and documented periodically This document covers the standards

for training and qualifying staff contents of training basic aerodynamics and different aspects of deicing anti icing operations It will provide standards for setting up a proper training and qualification program for deicing and anti icing of aircraft on the ground Background information to support this training program is provided to make the material a better tool for the preparation and execution of the training and qualification and the quality control process It is intended to provide a common basis for deicing anti icing training and qualification for deicing providers and airlines Each organization involved is responsible for complying with local regulations and requirements imposed by manufacturers of aircraft equipment and fluids by regulatory and environmental authorities A Standard Teaching Plan and the Practical Assessment are included This material was compiled using various international documents with support from SAE documents and individually contributed editorial comments Its purpose is to serve as a Globalized Deicing Training Manual The document is intended to promote and develop safe practices effective procedures and improved technology related to training of aircraft ground operations in winter conditions to ensure the highest possible levels of safety for passengers flight crew and ground personnel It can be utilized to develop a set of commonly agreed training practices and procedures for the deicing anti icing of aircraft on the ground reflecting current industry best practice It shall ensure continued compliance with all relevant standards and regulatory requirements and shall ensure that it continues to reflect current industry best practice **Deicing Facility Operational Procedures** G-12DF Deicing Facilities Committee,2023 This SAE Aerospace Recommended Practice ARP provides guidelines for the standardization of safe operating procedures to be used in performing services and maintenance at designated deicing facilities DDFs comprising both central deicing facilities CDFs and remote deicing facilities These procedures are necessary for the proper deicing anti icing of aircraft on the ground and performance of associated checks in accordance with the various approved ground icing programs while considering applicable local environmental operational and economic requirements This document should be used by operators regulators and airport authorities to develop and standardize approvals and permits for the establishment and operation of a DDF The coordination of stakeholders is required prior to the approval of design plans for a deicing facility Operating procedures shall be agreed to in writing by all air operators airport authorities regulators and service providers prior to commencing deicing operations ARP5660 has been revised to include additional technical content as well as to reduce redundant information contained in other SAE documents All references to ARP5149 and ARP4737 have been replaced by references to AS6286 and AS6285 respectively AS6285 forms one part of three related SAE Aerospace Standards AS and should be read in conjunction with AS6286 and AS6332 Collectively AS6285 AS6286 and AS6332 are known to the international community as the global aircraft deicing standards The lead document is AS6285 which all the other documents support and should therefore be in agreement *Pilot Guide* ,1994 **Training Program Guidelines for Deicing/Anti-Icing of Aircraft on Ground** G-12T Training and Quality Programs Committee,2019 This document establishes the minimum criteria for effective training of air carrier and contractor

personnel to deice anti ice aircraft to ensure the safe operation of aircraft during ground icing conditions Appendix D specifies guidelines for particular airplane models SAE G 12T Training and Quality Programs Committee recommends ARP5149 Training Program Guidelines for Deicing Anti Icing of Aircraft on Ground be cancelled since the requirements in this ARP have been superseded by Aerospace Standard AS6286 Training and Qualification Program for Deicing Anti Icing of Aircraft on the Ground including the six corresponding slash sheets Both documents address training for aircraft ground de anti icing and AS6286 was developed as a global standard with the intention of having it supersede ARP5149 As a result all the appropriate requirements in the ARP have been carried over to the new AS i e there are no aspects of the ARP that are not covered by the superseding AS As such ARP5149 should be cancelled and considered for Archival Use Only This proposal to cancel SAE ARP5149 is based on the guidance provided in the SAE Aerospace Council document Organization and Operating Procedures section 7 4 2 which identifies that one of the grounds for cancelling a ballot is when its technical requirements are totally superseded by another document **Training Program Guidelines for Deicing/Anti-Icing of Aircraft on Ground-Digital Annex** G-12T Training and Quality Programs Committee,2019 This Digital Annex DA contains the current full PDF version of ARP5149B Training Program Guidelines for Deicing Anti Icing of Aircraft on Ground as well as jpeg format files of Appendix D Application Guidelines Configuration Critical Component and Spray Area Diagrams for Aircraft The jpeg diagram files may be used by purchasers in accordance with the terms of the included license agreement SAE G 12T Training and Quality Programs Committee recommends ARP5149 Training Program Guidelines for Deicing Anti Icing of Aircraft on Ground be cancelled since the requirements in this ARP have been superseded by Aerospace Standard AS6286 Training and Qualification Program for Deicing Anti icing of Aircraft on the Ground including the six corresponding Slash Sheets Both documents address training for aircraft ground de anti icing and AS6286 was developed as a global standard with the intention of having it supersede ARP5149 As a result all the appropriate requirements in the ARP have been carried over to the new AS i e there are no aspects of the ARP that are not covered by the superseding AS As such ARP5149 should be cancelled and considered for Archival Use Only This proposal to cancel SAE ARP5149 is based on the guidance provided in the SAE Aerospace Council document Organization and Operating Procedures section 7 4 2 which identifies that one of the grounds for cancelling a ballot is when its technical requirements are totally superseded by another document Deicing/Anti-Icing Diagrams/No Spray Zones G-12T Training and Quality Programs Committee,2019 This document shall be used in conjunction with AS6286 Training and Qualification Program for Deicing Anti icing of Aircraft on the Ground AS6286 1 Processes Including Methods AS6286 2 Equipment AS6286 3 Fluids AS6286 4 Weather AS6286 5 Health Safety and First Aid SAE G 12T Training and Quality Programs Committee recommends AS6286 1 to AS6286 6 be cancelled since the requirements in this AS have been superseded by and re introduced into Aerospace Standard AS6286 Training and Qualification Program for Deicing Anti icing of Aircraft on the Ground which now includes the six corresponding

Slash Sheets All of these documents address training for aircraft ground de anti icing AS6286 was developed as a global standard and the slash sheets caused confusion in some areas As a result all the appropriate requirements in AS6286 Slash Sheets 1 to 6 have been carried over to the new AS i e there are no aspects of the slash sheets that are not covered by the superseding AS As such AS6286 1 to AS6286 6 should be cancelled and considered for Archival Use Only This proposal to cancel SAE AS6286 1 to AS6286 6 is based on the guidance provided in the SAE Aerospace Council document Organization and Operating Procedures section 7 4 2 which identifies that one of the grounds for cancelling a document is when its technical requirements are totally superseded by another document

The Enigmatic Realm of **As6285 Aircraft Ground Deicing Anti Icing Processes Sae**: Unleashing the Language is Inner Magic

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As6285 Aircraft Ground Deicing Anti Icing Processes Sae Introduction

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