Aircraft Deicing Glossary

Issue 4 – October 2025

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The *Aircraft Deicing Glossary*:

- is a descriptive document
- is not a normative document
- does not replace documents from regulators
- does not replace SAE Standards
- does not replace aircraft manufacturer documentation
- does not replace engine manufacturer documentation
- does not replace fluid manufacturer documentation
- always rely on the original documentation.

Other documents by Jacques Leroux
Guide to Aircraft Ground Deicing
Compendium of Aircraft Deicing Research

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Abstract

This *Glossary* is a descriptive document providing contextual definitions of terms used in the domains of aircraft ground deicing, aircraft engine icing, rotorcraft deicing, and runway deicing.[1]

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Preface

Work on this *Glossary* began during a discussion of one simple observation: the meaning of a word is determined by its context. This observation then led to a question: could ambiguity in the deicing vocabulary be diminished? The task was to examine the contextual variance in deicing terminology and produce succinct definitions for each term.

This *Glossary* attempts to bring clarity to the deicing terms acknowledging that the same words can have different meanings, can adapt, and change over time. It captures the contemporary definitions of words used in aircraft deicing, rotorcraft deicing, engine icing, and runway deicing. The *Glossary* further aims at functioning as a pedagogical and relational tool, connecting concepts whose relationship may not always be obvious. For example, the entry for freezing point depression is linked to colligative properties.

The *Glossary* assembles information in one document that can be used by members of the deicing community, whether experienced or new to the field. The *Glossary* aspires to be a tool that can be used by any person, at any time, in any part of the world, to access agreed upon meanings and, hopefully, be more trustworthy than casual internet searches.

[1] Get updates of this *Glossary* by emailing a request to jleroux8@outlook.com.

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Explanatory Notes

Italic: examples and titles are set in italic.

Reference numbers: the reference numbers at the end of each definition are clickable.

Small cap: words or expressions in small caps are defined in this *Glossary*. Underlined small caps indicate clickable links (press Ctrl + click to follow link) bringing you to that definition within the *Glossary*. Example: FROST.

Spelling: the words are spelled in United States English, but references are quoted in their original spellings. See the *Harmonization and Quality Criteria of SAE G-12 Standards* document for more information.[197]

Square brackets: the domains, comments, and reference short forms are given in square brackets.

Sometimes the same reality can have two terms, depending on the regulatory authority. For example, this is the case with *check* and *inspection*. The FAA and other regulators use the expression *pretakeoff contamination check*, whereas Transport Canada uses *pretakeoff contamination inspection*. Entries are made for both.

Abbreviations and Acronyms

Acronyms: a more complete list of abbreviations and acronyms is available in the *Guide to Aircraft Ground Deicing*.[127]

$[H^+]$	hydrogen ion concentration in mole per liter
AAF	aircraft anti-icing fluid
ABL	atmospheric boundary layer
ACARS	Aircraft Communications Addressing and Reporting System
ADF	aircraft deicing fluid
AIR	Aerospace Information Report (SAE)
AMS	Aerospace Material Specification (SAE)
AOA	angle of attack
AOC	air operator certificate (Transport Canada)
ARP	Aerospace Recommended Practice (SAE)
AS	Aerospace Standard (SAE)
BLDT	boundary layer displacement thickness
BOD	biochemical oxygen demand
bp	boiling point
CAP	corrective action plan
CDF	central deicing facility
CMO	Certificate Management Office (FAA)
COD	chemical oxygen demand
CSFF	cold-soaked fuel frost
d	dextrorotatory enantiomer
DDF	designated deicing facility
dl	racemic mixture of enantiomers
EC_{50}	effective concentration 50%
EFB	electronic flight bag
FAS	forced air system
fp	freezing point
GIDS	ground ice detection system
GRF	global reporting format
GRV	glycol recovery vehicle
HHET	high humidity endurance test, high humidity endurance time

HOT	holdover time
HOTDR	holdover time determination report
HOTDS	holdover time determination system
HOUC	highest operational use concentration
HOUR	highest operational use refraction
HOWV	highest on-wing viscosity
HSR	high speed ramp
HUPR	highest usable precipitation rate
HUPR	highest usable precipitation rate
IPS	ice protection system
IQ	initial qualification
KPI	key performance indicator
l	levorotatory enantiomer
LAAT	lowest aerodynamic acceptance temperature
LC_{50}	lethal concentration 50%
LOUT	lowest operational use temperature
LOWV	lowest on-wing viscosity
LSR	low speed ramp
LUPR	lowest usable precipitation rate
LVO	low visibility operations
LWES	liquid water equivalent system
mol wt	molecular weight
mp	melting point
MSDS	material safety data sheet
MSR	middle speed ramp
OAT	outside air temperature
OpSpec	operations specification
p	page (plural pp)
PIC	pilot-in-command
PR	periodic requalification
RIPS	rotor ice protection system
RH	relative humidity
RCAM	runway condition assessment matrix
RWYCC	runway condition code
ROGIDS	remote on-ground ice detection system
s	section (plural ss)
SDS	safety data sheet
SMR	saturation mixing ratio
SMS	safety management system
SQ	site qualification
sub verbo	under the word (plural *sub verbis*)
TAT	total air temperature
ThOD	theoretical oxygen demand
TOD	total oxygen demand
UQ	unit qualification
WSET	water spray endurance test, water spray endurance time

Recently Added Terms

Issue 4 of the *Aircraft Deicing Glossary* includes a total of 1087 defined terms, with 123 new additions.

air mass
allowance time table
AMIL snow machine
anti-icing performance test plate
artificial snow
associative thickener
Automated Surface Observing System (ASOS)
Automated Weather Observing System (AWOS)
balance
blackbody
bleed air
bleed air ice protection system
Brookfield counter-rotating mixer
Brookfield viscometer
cause-and-effect diagram
classification
composite test plate
composition-of-matter specification
conditions conducive to airframe icing in flight
contract weather observer
crawling
desktop procedure
dilution failure
discrepancy
edge effect
electroimpact ice protection system
electrothermal ice protection system
engine inlet electrothermal ice protection system
engines-on deicing
ethanol
evaporative ice protection system
failure zone
fan shape
film breaks
fish bone diagram
fisheyes
five whys
fluid erosion
flash freezing
fluid surface freezing
foreword
freezing point depressant ice protection system
front
frost formation chart
frosticator test plate
hangaring
high viscosity initial qualification sample
high viscosity preproduction sample
high viscosity sample
human factors
ice accretion
ice protection system
in-flight anti-icing ice protection system
in-flight deicing ice protection system
intercycle ice
interrupted deicing
interrupted operation
inversion
irregularity
Ishikawa diagram
isopropanol
isopropyl alcohol
limited nonconformity
local nonconformity
loss of gloss
low viscosity initial qualification sample
low viscosity preproduction sample
low viscosity sample
methanol
modifications approved by the purchaser
natural snow
no direct spray areas
no-spray areas
no-spray Type II, Type III, or Type IV areas
nozzle
NCAR snow machine
one-step anti-icing only

Glossary

1,3-propanediol, **1.** [chemistry] Chemical Abstract registry number 503-30-0, alternate names: trimethylene glycol, 1,3-dihydroxypropane, 1,3-propylene glycol; molecular formula $C_3H_8O_2$; mol wt 76.10, bp 210-212 °C. **2.** [aircraft deicing] a FREEZING POINT DEPRESSANT rarely used in the formulation of aircraft deicing/anti-icing fluids in the early 2000s. – Compare ETHYLENE GLYCOL, PROPYLENE GLYCOL.[144,155] [Merck Index, Ross]

abstract, [documentation] a concise summary of a research paper, article, report or book. It provides an overview of the key objectives, methods, results, and conclusions of the work, thereby offering readers a clear understanding of its content. Abstracts aim to capture and distill essential content for a quick read, yielding a grasp of purpose and significance that would otherwise take much time to acquire.

accelerated aging, **1.** [material science] the process of testing materials by exposing them to controlled environments that simulate the effects of time in a shorter period. This involves subjecting materials to conditions such as heat, moisture, chemicals, radiation, or electricity to observe changes in their properties like tensile strength, durability, or resistance to corrosion or degradation. The goal is to predict how materials will perform over time under normal conditions by observing their behavior under these intensified conditions. This method is particularly useful for assessing the longevity and reliability of materials used in various applications. **2.** aircraft

deicing fluids are subjected to a number of accelerated aging protocols such as the THERMAL STABILITY–ACCELERATED AGING test or to measure their effects on aircraft materials.[44,165,167] [Britannica, SAE AMS1424, SAE AMS1428].

acceptable fluid, **1.** [fluid failure] anti-icing fluid that may be sporadically covered with frozen precipitation but can absorb more contamination because its overall surface has not met failure conditions. **2.** [aircraft deicing] aircraft deicing/anti-icing fluid that fulfills specification, fluid manufacturer, aircraft manufacturer and regulatory requirements.[135] [Myers]

accountable executive, **1.** chief executive officer (CEO). **2.** a position defined under regulations as responsible and accountable for operations of an airline. **–** Synonym: PROGRAM MANAGER.[51,226] [CARs 106.02, WESTJET]

accountable person, see PROGRAM MANAGER. – Synonyms: WINTER PROGRAM MANAGER, RESPONSIBLE PERSON, ACCOUNTABLE EXECUTIVE.

accretion, **1.** [cloud physics] the growth of frozen precipitation particle through the collision of an ice crystal or snowflake with supercooled water droplets, which freeze instantly on contact. **2.** the agglomeration of liquid or frozen particles; *ice can accrete (known as ACCRETION ICE) in flight on the leading edge of aircraft*.[74] [Dunlop]

accretion ice, **1.** [aircraft in-flight icing] name given to ice accreted mostly on the leading edge of aircraft in flight. **2.** growth, buildup or formation of ice on an aircraft surface in-flight. – Synonym: ICE ACCRETION. Colloquial synonym: IMPACT ICE. See ACCRETION, IN-FLIGHT ICING, SUPERCOOLED WATER.[174] [SAE ARP5624]

accuracy, [chemistry, engineering, metrology] the closeness of agreement between a measured quantity value and a true quantity value, in other words, the measure of how close the result of a given analysis (or set of results) is to the correct or true value. The concept accuracy is not a quantity and is not given a numerical quantity value. A measurement is said to be more accurate when it offers a smaller measurement error. – Synonyms: MEASUREMENT ACCURACY, ACCURACY OF MEASUREMENT [French: exactitude, exactitude de mesure]. Compare PRECISION.[28,33,116] [Atkins, Bell, JCGM].

accuracy of measurement, see ACCURACY.

acoustic liner, [aircraft engine] an acoustic absorbent material used in the intake duct of jet engines to reduce noise. – See ENGINE BARREL ICING.[102] [Greaves]

active frost, **1.** [aircraft deicing] an atmospheric condition conducive to frost formation and continued frost growth. **2.** [aircraft deicing] a holdover time precipitation condition that can occur when a) the aircraft surface temperature is at or below the FROST POINT, or b) there is water in liquid form (e.g., dew) on the aircraft surface and the surface temperature falls to or is below 0 °C (frozen dew). **3.** [aircraft deicing] frost formation can also occur after an anti-icing fluid holdover time has expired. **4**. [aircraft deicing] a holdover precipitation condition whose rate is low but not quantified. **5.** [meteorology] active frost does not have a METAR CODE. – See ADVECTION, DEW, FROST, FROZEN DEW, RADIATIONAL COOLING, FROST FORMATION CHART.[88,107,112,188,189,203,216] [FAA General Info, Horrigan 2011, ICAO 9640, SAE AS6285, SAE AS6286, SIAGDP, TC TP 14052]

adaptations, [safety science] decisions to deviate from formalized rules or procedures that are intentionally performed with the individual being aware that their actions are contrary to the rules. – See EXCEPTIONAL ADAPTATIONS, OPTIMIZING ADAPTATIONS, ROUTINE ADAPTATIONS, SITUATIONAL ADAPTATIONS.[219] [TSB]

additive package, [aircraft deicing fluids] a mixture of products added in relatively small but precise quantity to glycol and water to make new or recycled Type I; typically, the ingredients of an additive package include glycol, water, surfactant, pH control products, corrosion inhibitors, and dye. Glycol and water in the additive package act as SOLVENT for the other components in the formulation. – Colloquial short form synonym: ADPACK.

adherence failure, see ADHESION FAILURE.

adhesion failure, [fluid failure] a form of fluid failure that occurs when a layer of ice crystals builds up, the crystals come in contact with the surface below and are bonded to it. – Synonym: ADHERENCE FAILURE. See FLUID FAILURE.[135] [Myers]

adiabatic, **1.** [aerodynamics, chemistry, meteorology, thermodynamics] related to an ideal process in which heat, mass, or momentum does not leave or enter a system—that does not mean temperature does not change. In an adiabatic process, generally the temperature will change; *if a gas expands under adiabatic conditions, the temperature falls; if a gas compresses under adiabatic conditions, the temperature rises*. **2.** [aerodynamics] said of a process where no heat is added or taken away. **3.** [meteorology] said of a process in which there is no exchange of heat or mass of an AIR PARCEL with the surrounding environment. See ADIABATIC COOLING, ADIABATIC WARMING, RAM RISE.[11,74,152,154,198] [AMS Glossary, Dunlop, Rennie, Rock, Shevell]

adiabatic cooling, [meteorology] the cooling that occurs to a parcel of air that moves upwards and is subject to expansion. – See ADIABATIC, AIR PARCEL.[11,74] [AMS Glossary, Dunlop]

adiabatic warming, [meteorology] the warming that occurs to a parcel of air that moves downwards and is subject to compression. – See ADIABATIC, AIR PARCEL [11,74] [AMS Glossary, Dunlop]

adjusted allowance time, **1.** a reduced ALLOWANCE TIME required by the occurrence of accelerated fluid drainage from wings when FLAPS and SLATS are extended (deployed) during taxi, reducing the allowance time of Type III/IV fluids (there are no allowance times for Type I/II fluids). **2.** adjusted allowance times are published in the FAA and Transport Canada *Holdover Time Guidelines*. – Compare STANDARD ALLOWANCE TIME.[89,176,178,212] [FAA HOT, SAE ARP5718, SAE ARP6207, TC HOT]

adjusted holdover time, **1.** a reduced HOLDOVER TIME required by the occurrence of accelerated fluid drainage from wings when FLAPS and SLATS are extended (deployed) during taxi, reducing the holdover time of Type I/II/III/IV fluids. **2.** adjusted holdover times are published in the annual FAA and Transport Canada *Holdover Time Guidelines*. – Compare STANDARD HOLDOVER TIME.[89,176,178,212] [FAA HOT, SAE ARP5718, SAE ARP6207, TC HOT]

adpack, colloquial short form for ADDITIVE PACKAGE.

advanced air mobility aircraft, an umbrella term for aircraft that are typically highly automated, electrically powered, and have vertical takeoff and landing capability. Many of these aircraft fall into the POWERED-LIFT category are often referred to as AIR TAXI.[78] [FAA AAM]

advancing contact angle, **1.** [surface chemistry] a measurement of wetting behavior. A large advancing contact angle suggests poor wetting whereas a small advancing CONTACT ANGLE indicates better wetting. **2.** the angle formed by a liquid as it spreads out (advances) onto a surface. **3.** advancing contact angle is influenced by factors such as surface chemistry (hydrophilicity, hydrophobicity), surface contamination, SURFACE TENSION, and roughness. – See CONTACT LINE, RECEDING CONTACT ANGLE, HYDROPHILIC, HYDROPHOBIC, WETTING.[162] [SAE AIR6232]

advection, [meteorology] generally, horizontal mass transport motion. **2.** [aircraft deicing] advection can result in changes to aircraft surface conditions; *wind can replenish wing surface heat that has been lost to RADIATIONAL COOLING, thus preventing frost formation; at dawn, solar heating can result in a rapid rise in humidity as dew is evaporated. Aircraft on the sunny side of the terminal may not be affected as they absorb the solar energy, but advection of the moist cold air over surfaces in the shade may result in frost formation and the wings may go from fully dry to fully frosted within a few minutes*. – See ADVECTION FOG, FROST.[8,11,74,107] [Ahrens, AMS Glossary, Dunlop, Horrigan 2011]

advection fog, **1.** [meteorology] fog that forms through the horizontal motion of stable air carried over a cold surface causing it to cool below its DEWPOINT, e.g., moist air over a cold body of water; *sea fog*. **2.** [meteorology] pre-existing fog carried over to a neighboring area; *the sea fog invaded the land*.[11,74] [AMS Glossary, Dunlop]

aerodynamic acceptance, see AERODYNAMIC ACCEPTANCE TEST.

aerodynamic acceptance test, **1.** a wind tunnel test performed at different air temperatures to determine whether deicing/anti-icing fluids (Type I, II, III, or IV fluids) meet FLOWOFF requirements during TAKEOFF GROUND ROLL acceleration and INITIAL CLIMB. **2**. a wind tunnel test which may be performed under three different acceleration profiles known as the HIGH SPEED RAMP, MIDDLE SPEED RAMP, or LOW SPEED RAMP. **3.** a test whose outputs are the LOWEST AERODYNAMIC ACCEPTANCE TEMPERATURE and FLUID ELIMINATION based on the average final thickness of the remaining fluid on the wind tunnel test section. There are two different outputs for each ramp tested for a given fluid; *for example, a given dilution of a Type I concentrate may have a high speed ramp lowest aerodynamic acceptance temperature of -45° C with a fluid elimination final thickness of 350* µm *and a low speed ramp aerodynamic acceptance temperature of -38 °C with a fluid elimination final thickness of 440 µm.* **4.** a test defined in AS5900. **5.** a DETERMINE AND REPORT TEST for Type I, II, III, and IV fluids. **5.** the lowest aerodynamic acceptance temperatures resulting from the aerodynamic acceptance tests are used in the determination of the LOWEST OPERATIONAL USE TEMPERATUREs.[162,176,178,183,216] [SAE AIR6232, SAE ARP5718, SAE ARP6207, SAE AS5900, TC TP 14052]

aerodynamic degradation, [icing aerodynamics] condition when FROZEN CONTAMINATION, roughness, FAILED FLUID, or UNFAILED FLUID causes degradation of the aerodynamic performance or control of the aircraft. – See AERODYNAMIC ROUGHNESS, FLUID FAILURE CRITERIA.[179] [SAE ARP6852]

aerodynamic failure, [icing aerodynamics, aircraft deicing] an unquantified condition when FROZEN CONTAMINATION, AERODYNAMIC ROUGHNESS, FAILED FLUID, or UNFAILED FLUID causes unacceptable degradation of the aerodynamic performance or control of the aircraft; *for example, an unfailed fluid below its LOWEST AERODYNAMIC ACCEPTANCE USE TEMPERATURE may cause unacceptable lift loss*. – See AERODYNAMIC DEGRADATION [179] [SAE ARP6852]

aerodynamic roughness, any irregularities to an otherwise smooth surface over which a fluid (liquid or gas) flows. Examples of surface irregularities include contamination due to snow, ice, frost, bugs, dirt, chipped or cracked paint, dents, scratches and the like. These surface irregularities perturb the fluid flow resulting in boundary layer TRANSITION and SEPARATION. – See BOUNDARY LAYER.

aerodynamically quiet areas, [aerodynamics] aircraft areas consisting of aerodynamically quiet cavities and aerodynamic surfaces with separated airflow. – See SEPARATION, AERODYNAMICALLY QUIET CAVITY, AERODYNAMICALLY QUIET SURFACE.[135] [Myers]

aerodynamically quiet cavity, aircraft cavity insufficiently scoured by airflow into which viscous fluids may seep but where drainage is inadequate for such to seep out.[135] [Myers]

aerodynamically quiet surface, **1.** an aircraft surface zone of low-velocity airflow where RESIDUAL FLUID will move very slowly or not at all. **2.** at takeoff, a zone of low-velocity airflow exists at the surface where trailing and possibly leading-edge devices are deployed to approximate the profile of a highly cambered AIRFOIL (thereby substantially increasing the lifting capability of the wing at low speeds), the airflow may separate from the aerodynamic surface, forming a separation bubble (typically breakaway of laminar airflow followed by a turbulent airflow reattachment). As a result, in the zone of very low-velocity airflow any residual fluid will move very slowly or not at all. – See LAMINAR FLOW, TURBULENT FLOW, AERODYNAMICALLY QUIET AREAS.[135] [Myers]

aft-mounted engine, [aircraft structure] an engine mounted at the rear of the fuselage; *for example, the MD-11 has one aft mounted engine (and two wing mounted engines); the Bombardier (now Mitsubishi) CRJ and Embraer ERJ aircraft have two aft-mounted engines*. – Synonym REAR-MOUNTED ENGINE.

ailerons, [aircraft components] control surfaces, generally on the outer part of the wing (near the tip) and mounted on the rear of the wing, which operate differentially to raise lift on one side of the wing and lower it on the other, causing the aircraft to roll about its LONGITUDINAL AXIS. The result of ROLL produces a turn of the aircraft.[85,198] [FAA H-8083-3C, Shevell]

air carrier, [FAA] a person who undertakes directly by lease, or other arrangement, to engage in air transportation.[1] [14 CFR § 1.1]

air mass, [meteorology] a widespread body of air with horizontally uniform properties (e.g., temperature, humidity, etc.); in addition, the vertical temperature and moisture variations are approximately the same over its horizontal extent. The boundaries between air masses are referred to as FRONTs. – See COLD FRONT, WARM FRONT, occluded front, STATIONARY FRONT.[11,74] [AMS Glossary, Dunlop]

air operator, [Transport Canada] the holder of an air operator certificate.[216] [TC TP 14052]

air operator certificate (AOC), [Transport Canada] a certificate issued under the Canadian Air Regulations that authorizes the holder of the certificate to operate a commercial air service (the short form is OPERATOR CERTIFICATE).[216] [TC TP 14052]

air parcel, an imaginary volume of air to which may be assigned any or all the basic dynamic and thermodynamic properties of atmospheric air and retains its shape and characteristics as it moves in the atmosphere. An air parcel is large enough to contain a very great number of molecules, but small enough so that the properties assigned to it are approximately uniform within it. – See ADIABATIC.[11] [AMS Glossary]

air taxi, an advanced air mobility POWERED-LIFT aircraft typically highly automated, electrically powered, with vertical takeoff and landing capability.[78] [FAA AMM]

aircraft anti-icing fluid (AAF), see ANTI-ICING FLUID.

Aircraft Communications Addressing and Reporting System (ACARS), **1.** digital data link system using radio or satellite allowing for transmission of short messages between the aircraft and ground stations. **2.** [aircraft deicing] new communication platforms utilize electronic tablets as an electronic flight bag (EFB) (e.g., iPads) on flightdecks and in deicing vehicles. Deicing coordinators can interact with the flightcrew and deicing crew using web-based dispatching. For pad operations, including movement configuration and guidance, electronic message boards are now commonly used at deicing facilities.[175] [SAE ARP5660].

aircraft deicing facility, see DEICING FACILITY.

aircraft deicing fluid (ADF), see DEICING FLUID.

aircraft deicing pad, see DEICING PAD.

aircraft hydraulic fluid, **1.** oils used in struts and hydraulic systems. **2.** [aircraft brakes] potential contaminants for carbon brakes.[160] [SAE AIR5490]

aircraft icing conditions, atmospheric conditions that result in the buildup of ice on an aircraft's leading-edge surfaces in flight caused by the impingement and freezing of liquid (usually supercooled) hydrometeors, and on the whole aircraft when it is on the ground. – See GROUND ICING CONDITIONS, IN-FLIGHT ICING, IN-FLIGHT ICING CONDITIONS, HYDROMETEORS.[219] [TSB]

aircraft lubricants, **1.** greases and oils for aircraft. **2.** [aircraft brakes] aircraft lubricants can be potential contaminants for carbon brakes, particularly when applied to landing gear component.[160] [SAE AIR5490]

aircraft surface coating, **1.** a coating applied to an aircraft surface; *a drag-reducing aircraft surface coating; a dirt repelling aircraft surface coating; an aircraft surface coating to improve shine.* **2.** [aircraft deicing] a coating applied with properties that may be ICEPHOBIC, HYDROPHOBIC, SUPERHYDROPHOBIC, or HYDROPHILIC that may affect the WETTING of aircraft deicing fluids,

excluding surface finishes applied by the original equipment manufacturer. – Synonyms: SURFACE COATING, SURFACE FINISH.[162] [SAE AIR6232]

aircraft wash fluids, **1.** cleaning solutions applied to an aircraft and/or its components. **2.** [aircraft brakes] potential contaminants for carbon brakes.[160] [SAE AIR5490]

airfoil, [aerodynamics] a structure which provides an aerodynamic force when it interacts with a moving stream of air; *wing, propeller, rudder, trim tab are examples of airfoils*. 2. a structure, the shape of which gives rise to lower pressures on one surface (suction surface) compared with the other (pressure surface) when moving through a fluid (e.g., air).[28,85,198] [Atkins, FAA H-8083-3C, Shevell]

airframe, [aircraft components] the structural components of an airplane, including the framework and skin of such parts as the fuselage, empennage, wings, landing gear (minus tires), and engine mounts.

allowance time, **1.** estimated amount of time in which aircraft protection is expected to hold against contamination from ice pellets or small hail or other forms of precipitation mixed with these. **2.** Type III and Type IV fluids provide allowance times whereas there are no allowance times with Type I and Type II fluids. **3.** allowance times are derived from aerodynamic fluid flowoff performance data and visual inspection of fluids exposed to these precipitation types. **4.** allowance time tables and a LIST OF VALIDATED FLUIDS are published in the FAA and Transport Canada *Holdover Time Guidelines*. **5.** PRETAKEOFF CONTAMINATION CHECK (or the Transport Canada equivalent PRETAKEOFF CONTAMINATION INSPECTION) are never used to extend the time of allowance times as fluid failures with ice pellets or small hail cannot be determined by the process of pretakeoff contamination check or pretakeoff contamination inspection. See STANDARD ALLOWANCE TIME, ADJUSTED ALLOWANCE TIME, ALLOWANCE TIME TABLE.[89,176,178,212] [FAA HOT, SAE ARP5718, SAE ARP6207, TC HOT]

allowance time table, a table with allowance times for various ice pellet or small hail precipitation conditions and temperatures along with cautions and notes giving guidance to deicing crew and flightcrew. – See ALLOWANCE TIME.[176] [SAE ARP5718]

aluminum test plate, see STANDARD ALUMINUM TEST PLATE.

AMIL snow machine, [aircraft deicing fluid testing] a laboratory system developed by at the Anti-Icing Materials International Laboratory (AMIL) to 1) produce artificial snow and 2) dispense it on standard test plates at controlled rates. First, the artificial snow is made by freezing water droplets of about 25 µm generated by fine spray hydraulic nozzles in a 3 meter-high specialized cold chamber at a temperature of -25 °C. With the spraying, the air becomes supersaturated with water, the water droplets become supercooled, and then the artificial snow crystals are formed upon contact with the ground, and subsequently the snow crystal are collected. The obtained snow is an artificial rime of constant size of 1 to 2 mm. The density of this artificial snow is about 0.25 g/cm^3. This artificial snow can be stored for a period of up to two weeks. Prior to a test, the snow is sifted to exclude sintered particles. Second, the snow machine dispensing apparatus itself consists of a test setup where precipitation is achieved through an automated feeding system. This system moves along a 15° inclined standard test plate (30 cm × 50 cm), distributing snow via a

rotating cylinder grooved with small cavities. As the cylinder rotates, snow is released at the bottom, propelled by a low-pressure air feed (15 psi). The rotation speed of the cylinder is computer-controlled to achieve the desired PRECIPITATION RATEs, which is measured in real time by a BALANCE beneath the test plate. The maximum intensity that the apparatus can simulate is 30 g/dm²/h. – See SNOW TESTS, ARTIFICIAL SNOW, SNOW MACHINE, SINTERING. Compare NCAR SNOW MACHINE.[35,177,225] [Bernardin, SAE ARP5945, Villeneuve]

angle of attack (AOA), [aerodynamics] the acute angle between the CHORD LINE of the AIRFOIL and the direction of the RELATIVE WIND.[85] [FAA H-8083-3C]

annual recurrent training, [aircraft deicing] mandatory training, to be repeated every year, program that ensures personnel involved in deicing operations, including flightcrews, are brought up-to-date with the latest procedures, safety protocols, and best practices, as in the INITIAL QUALIFICATION TRAINING.[88,189,214] [FAA General Info, SAE AS6286, TC 622.11]

anomaly, **1.** something that deviates from what is normal or expected, or not in agreement with something else. It suggests a rare or unusual occurrence. **2.** [aircraft deicing] SAE AS6285 requires service providers and fluid manufacturers to have procedures to deal with nonconformities, anomalies, discrepancies, and irregularities. **3.** [meteorology] the deviation of a property, such as temperature or precipitation, in a given region over a specified period from the long-term average value for the same region. **4.** [meteorology] the difference between a forecast and the actual conditions that pertain at the predicted time. – Compare NONCONFORMITY, DISCREPANCY, IRREGULARITY.[11,53,74188] [AMS GLOSSARY, Cambridge, Dunlop, SAE AS6285]

anoxic, describing a process or system in which oxygen is deficient or absent; *anoxic water has no or very little oxygen*.[10,152] [Allaby, Rennie]

anti-icing, a precautionary procedure to protect aircraft surfaces from the formation or accumulation of freezing or frozen contamination, such as ice, snow, frost, or slush, for a limited period. – Compare DEICING.[75,82,112,135,181,182,188,214,216] [EASA EU Reg, FAA AC 120-60B, ICAO 9640, Myers, SAE AS5635, SAE AS5681, SAE AS6285, TC 622.11, TC TP 14052,]

anti-icing code, report given to the flightcrew, stating that deicing/anti-icing has been carried out and the details of the anti-icing procedure that was applied.[75,188] [EASA EU Reg, SAE AS6285]

anti-icing fluid, **1.** a fluid applied to an aircraft as a precautionary procedure to provide protection from the formation or accumulation of freezing or frozen contamination, including ice, snow, frost, or slush, on treated surfaces for a limited period. **2.** a fluid consisting of a) heated mixture of water and TYPE I CONCENTRATE, b) heated TYPE I READY-TO-USE, c) heated or unheated TYPE II/III/IV UNDILUTED, or d) heated or unheated mixture of water and Type II//III/IV. – Compare DEICING FLUID.[75,76,81,82,216] [EASA EU Reg, EASA SIB 2008-29, FAA 120-112, FAA 120-60B, TC TP 14052]

anti-icing performance, test consisting of the WATER SPRAY ENDURANCE TEST and the HIGH HUMIDITY ENDURANCE TEST. – Compare ENDURANCE TIME, HOLDOVER TIME.[89,165,167,212] [FAA HOT, SAE AMS1424, SAE AMS1428, TC HOT]

anti-icing performance test plate, 1. [aircraft deicing fluid testing] an aluminum alloy (AMS4037) 300 mm long, 100 mm wide and 1.6 mm thick adopted by SAE for the evaluation of the water spray endurance time and high humidity endurance time to qualify Type I fluids under AMS1424 and Type II/III/IV fluids under AMS1428. **2.** Along the top and two sides a line is marked 25 mm from the edge; ice crystals commencing in these zones are ignored as outside the test area. The bottom edge is unmarked. **3.** the average surface roughness is less than 0.5 micrometers. **4.** anti-icing performance test plates are mounted at ten degrees (10°) to the horizontal and placed on a chiller unit. **5.** test plates to generate endurance times used for holdover times, called STANDARD TEST PLATEs, are different from anti-icing performance test plates. – See EDGE EFFECT. Compare STANDARD ALUMINUM TEST PLATE, STANDARD COMPOSITE TEST PLATE, FROSTICATOR TEST PLATE.[135,165,166,177,184] [Myers, SAE AMS1424, SAE AMS1428, SAE ARP5945, SAE AS5901]

antioxidant treatment, [aircraft brakes] treatment applied to carbon brakes to reduce OXIDATION.[160] [SAE AIR5490]

appearance, **1.** [chemistry] the visual characteristic of a substance. **2.** [aircraft deicing fluids, runway deicing products] appearance an OPERATIONAL PROPERTY part of the qualification and sales specifications of aircraft deicing fluids and of RUNWAY DEICING PRODUCTs; *the appearance of this Type I is clear orange color liquid, substantially free of suspended matter*; *the appearance of this Type IV is green liquid with slight haze, substantially free from suspended matter; the appearance of this runway deicing product is blue liquid, free from skins and lumps*; *the appearance of this runway deicing product is white free flowing solid, free from foreign material*. **3.** the characteristics considered when performing the appearance test can be COLOR, color uniformity, TURBIDITY, homogeneity and SUSPENDED MATTER. **3.** a PASS-FAIL TEST for aircraft deicing fluids and runway deicing products.[165,167,168,169] [SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435]

apron, part of an airport, other than the maneuvering area, intended to accommodate the loading and unloading of passengers and cargo, the refueling, servicing, maintenance and parking of aircraft, and any movement of aircraft, vehicles and pedestrians necessary for such purposes.[216] [TC TP 14052]

aquatic toxicity, **1**. the harmful effects of chemicals and pollutants on aquatic organisms and ecosystems. **2.** [aircraft deicing and runway deicing products] evaluation of the effect of fully formulated deicing/anti-icing fluid (not just the glycols) and RUNWAY DEICING PRODUCTs, on fish (e.g., fathead minnows, rainbow trout) and aquatic invertebrates (e.g., *daphnia magna)*. **3.** aquatic toxicity is a DETERMINE AND REPORT TEST whose results are classified under ENVIRONMENTAL PROPERTY of aircraft deicing fluids and RUNWAY DEICING PRODUCTs. **4.** aquatic toxicity is generally reported as the LETHAL CONCENTRATION 50% (LC_{50}), the concentration that causes death in 50% of the test population (e.g., for fathead minnows or rainbow trout), or EFFECTIVE CONCENTRATION 50% (EC_{50}), the concentration that causes a specific effect such as immobilization in the test population (e.g., for *daphnia magna*). With metrics like LC_{50} and EC_{50}, a higher number indicates less toxicity because these values represent the concentration of a substance required to affect a given percentage of the test population (i.e., 50% for LC_{50} or EC_{50}); *for example, a product with a LC_{50} of 27,000 mg/L is less toxic than one with a LC_{50} of 1000 mg/L.*

– See ENVIRONMENTAL PROPERTIES, FLUID PROPERTIES.[44,165,167,168,169] [Britannica, SAE AMS1424, SAE AMS1428, SAE AMS1435]

aqueous solution, a SOLUTION in which the SOLVENT is water.[127] [Guide]

artificial snow, **1.** [general] human-made snow as opposed to naturally formed snow. **2.** [skiing] man-made and produced snow using snow machines. These machines spray tiny water droplets into cold air, which then freeze into snow-like particles. Ski resorts often use artificial snow to supplement natural snowfall and maintain ski conditions. **3.** [aircraft deicing fluid testing] snow made by: a) spraying fine water droplets in a cold chamber resulting in fine solid ice crystals that are collected on the cold chamber floor or b) shaving ice cores into ice shavings with a so-called NCAR SNOW MACHINE. – Compare NATURAL SNOW. See AMIL SNOW MACHINE, SNOW TESTS.[173,177] [SAE ARP5485, SAE ARP5945]

ash [runway contaminant], a grayish white to black soft solid residue of combustion normally originating from pulverized particulate matter ejected by volcanic eruption.[83] [FAA AC 150/5200-28G]

ASOS, see AUTOMATED SURFACE OBSERVING SYSTEM.

asphalt concrete degradation resistance, [runway deicing products] a PASS-FAIL TEST for RUNWAY DEICING PRODUCTs used in Europe where the reduction in adhesion value of the runway asphalt concrete surface must not be more than 50% when tested according to the method, known as LFV Method 2-98 (EN 12697-41), as described in AMS1431 and AMS1435.[168,169] [SAE AMS1431, SAE AMS1435]

associative thickener, **1.** a water-soluble polymer containing HYDROPHOBIC groups capable of forming non-covalent associations with other hydrophobic entities in solution. These hydrophobic interactions lead to the formation of micelle-like aggregates or network structures, which significantly enhance viscosity and impart shear thinning. These are used in high performance paints and ethylene glycol based anti-icing fluids. **2.** in aircraft anti-icing fluids associative thickener systems can provide good resistance to viscosity shear degradation and thermal degradation. The first Type IV fluid (ethylene glycol based) was formulated with an associative thickener. – See SHEAR THINNING FLUID, THICKENER, THICKENED FLUID.[57,58,115] [Carder 1998, Carder 1999, Jenkins]

asymmetrical deicing, the removal of contamination with deicing/anti-icing fluids or the prevention against contamination with anti-icing fluids in a manner that differs quantitatively or qualitatively between the two sides of the aircraft, including the wing, horizontal stabilizer and vertical stabilizer. Asymmetrical deicing is a safety concern due to the potential imbalance of aerodynamic forces that may affect the performance and control of the aircraft. *Examples of asymmetrical deicing: the use of Type I on the left wing and Type IV on the right wing; spot deicing on the right wing and no deicing on the left wing.* – Compare SYMMETRICAL DEICING.[112,145,188,189,216] [ICAO 9640, Oda, SAE AS6285, SAE AS6286, TC TP 14052

atmospheric boundary layer (ABL), see PLANETARY BOUNDARY LAYER.

atmospheric icing conditions, see AIRCRAFT ICING CONDITIONS.[219] [TSB]

attitude, [aerodynamics] the position of an aircraft as determined by the relationship to its axes and a reference, usually the Earth's horizon.[85] [FAA H-8083-3C]

audit evidence, records, statements of fact or other information, which are relevant to audit criteria and verifiable.[190] [SAE AS6332]

Automated Surface Observing System (ASOS), [meteorology] the primary automated weather and climate observing system in the United States, jointly owned and managed by the Federal Aviation Administration, the National Weather Service, and the Department of Defense. These systems are a network of automated weather stations, primarily located at airports, that provide real-time weather information to support aviation, weather forecasting, and research. ASOS systems measure various weather elements like temperature, wind speed and direction, precipitation, cloud height, visibility, and atmospheric pressure, offering continuous observations every minute. This data is crucial for flight planning, safety, and various weather-related applications. Observations are reported in METARs. See CONTRACT WEATHER OBSERVER, AUTOMATED WEATHER OBSERVING SYSTEM.[140] [NWS ASOS]

Automated Weather Observing Systems (AWOS), [meteorology] worldwide standardized fully automated and configurable weather observing systems designed specifically for use at airports. These systems provide continuous, real-time weather information for airports and other facilities. AWOS systems collect and report on various weather parameters like wind speed and direction, temperature, dewpoint, pressure, visibility, and cloud ceiling. This information is crucial for safe aviation operations and is disseminated to pilots via radio and other communication channels, including METARs. – See AUTOMATED SURFACE OBSERVING SYSTEM.[141] [NWS AWOS]

Avogadro's number, **1.** a numerical value of $6.02214976 \times 10^{23}$. **2.** number of atoms, molecules, ions, electrons or a specified group of particles in a mole. **3.** Avogadro's number is dimensionless; it expresses the number of constituent particles in a mole. – See MOLE, DIMENSIONLESS QUANTITY.[49] [Bureau]

AWOS, see AUTOMATED WEATHER OBSERVING SYSTEM.

axes of an aircraft, three imaginary lines that pass through an aircraft's center of gravity. The axes can be considered as imaginary axes around which the aircraft turns. The three axes pass through the center of gravity at 90° angles to each other. The axis from nose to tail is the LONGITUDINAL AXIS, the axis that passes from wingtip to wingtip is the LATERAL AXIS, and the axis that passes vertically through the center of gravity is the VERTICAL AXIS.[85] [FAA H-8083-3C]

balance, [chemistry] an accurate weighing device.[152] [Rennie]

barrel icing, see ENGINE BARREL ICING.

basket, [aircraft deicing unit] partially enclosed work platform mounted on a boom and used by deicing personnel to perform deicing/anti-icing, various checks of the aircraft and its component, such as the PREFLIGHT CONTAMINATION CHECK, TACTILE CHECK or POSTDEICING/ANTI-ICING CHECK. – Synonym, OPEN BASKET. Colloquial synonyms: BUCKET, OPEN BUCKET. See OPEN BASKET DEICING UNIT. Compare ENCLOSED CABIN.[150,224] [Polar, Vestergaard]

batch, a quantity of something produced in one operation under uniform conditions. – Compare LOT.[127,106] [Guide, Hibbert]

bench instrument, [chemistry] a measuring instrument designed to be used on a laboratory bench. Synonym: BENCHTOP INSTRUMENT. – See LABORATORY INSTRUMENT. Compare FIELD INSTRUMENT.

benchtop instrument, a measuring instrument designed to be used on a laboratory bench, *benchtop pH meter, benchtop balance*. – Synonym: BENCH INSTRUMENT. See LABORATORY INSTRUMENT. Compare FIELD INSTRUMENT.

bimetallic temperature gauge, a device to measure temperature using two metallic strips bonded together. As temperature increases, one metal expands more than the other, causing the strip to curl. This mechanical motion is read on an analog temperature numbered scale or digital readout. – See TEMPERATURE GAUGE, THERMOMETER.

biochemical oxygen demand (BOD), **1.** [environmental science] the amount of oxygen taken up by microorganisms that decompose organic products in water. BOD is measured by keeping a sample of water containing a known amount of oxygen and product for a number of days (e.g., 5, 15, 20, 28) (incubation period) at a given temperature (e.g., 5 °C, 20 °C). The remaining amount of oxygen is measured at the end of the test. The result is reported in kg O_2/kg of product. **2.** [aircraft deicing fluids and runway deicing products] a DETERMINE AND REPORT TEST whose result is classified under ENVIRONMENTAL PROPERTY and required in the QUALIFICATION of Type I/II/III/IV fluids and RUNWAY DEICING PRODUCTs. – See CHEMICAL OXYGEN DEMAND, THEORETICAL OXYGEN DEMAND, TOTAL OXYGEN DEMAND, BIODEGRADABILITY.[152,165,167,168,169,195] [Rennie, SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435, Schaschke]

biodegradability, **1.** [science] the ability of a material to be broken down by microorganisms and be reabsorbed by the natural environment. **2.** [aircraft deicing fluids, runway deicing products] a DETERMINE AND REPORT TEST whose results are classified under ENVIRONMENTAL PROPERTY of aircraft deicing fluids and RUNWAY DEICING PRODUCTs estimated by taking the ratio of the BIOCHEMICAL OXYGEN DEMAND (BOD) to the CHEMICAL OXYGEN DEMAND (COD).[44,165,167,168,169] [Britannica, SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435.]

black ice, a colloquial name for clear ice coating roadway or other paved surfaces. In the DOMAIN of aircraft deicing the preferred term is not black ice but CLEAR ICE and refers to ice buildup specifically on the aircraft.[74] [Dunlop]

blackbody, [thermal radiation] an ideal body that is a perfect emitter of radiation. – See EMISSIVITY.[28,195] [Atkins, Schaschke]

bleed air, air bled from the compressor of a gas turbine for auxiliary use, commonly used in in-flight ICE PROTECTION SYSTEMs as a source of heat, and also for pneumatic systems.– See BLEED AIR ICE PROTECTION SYSTEM, BLEED AIR DUCTS.[174] [SAE ARP5624]

bleed air ducts, [aircraft engine] passages that divert compressed air from the engine compressor section for various purposes, such as powering aircraft systems, heating the cabin or providing

heat to in-flight ICE PROTECTION SYSTEMs. They are typically located within the engine NACELLE and can connect to different parts of the aircraft.[85] [FAA H-8083-3C]

bleed air ice protection system, an ICE PROTECTION SYSTEM using BLEED AIR as a source of heat to protect aircraft surfaces against in-flight icing, including leading edges of wings, leading edges of horizontal and vertical stabilizers, and engine inlets. – See EVAPORATIVE ICE PROTECTION SYSTEM.[5,79] [14 CFR § 33.66, FAA AC 20-73A]

bleed-through, insufficient color intensity of a Type II/III/IV to prevent visual interference from a layer of orange Type I underneath the Type II/III/IV. – See COLOR.[176] [SAE ARP5718]

blowing snow, **1.** [meteorology] snow lifted from the surface of the earth by the wind to a height of 6 feet (2 meters) or more above the ground and blown about in such quantities that the reported horizontal visibility is reduced to less than 7 miles (11 km). Blowing snow can be falling snow or snow that has already accumulated but is picked up and blown about by strong winds. **2.** a condition with METAR CODE BLSN. **3.** [aircraft deicing] a condition to be used with the snowfall intensity as a function of prevailing visibility table. – See SNOWFALL VISIBILITY TABLE.[74,89,142,212] [Dunlop, FAA HOT, NOAA FMH-1, TC HOT]

bottom loading, [chemical industry] loading a tank, rail car or TANK TRUCK from the bottom outlet. Bottom loading is usually frowned upon for fear of spill unless there is a DRY DISCONNECT COUPLING. – Compare SPLASH LOADING.

boundary layer, **1.** [mechanical engineering, aerodynamics, aircraft fluid testing] the region within a fluid (gas or liquid) flowing over a surface which is affected primarily by the viscosity of the fluid. The fluid velocity changes from zero at the surface to its free-stream value at the edge of the boundary layer. **2.** [meteorology] the thin layer of fluid where adhesion causes different forms of flow than its freely moving fluid; in meteorology a distinction is made between PLANETARY BOUNDARY LAYER and SURFACE BOUNDARY LAYER. – See BOUNDARY LAYER DISPLACEMENT THICKNESS.[28,74,198] [Atkins, Dunlop, Shevell]

boundary layer displacement thickness (BLDT), **1.** [aerodynamics] the measured displacement of airflow over a surface. **2.** [aircraft deicing fluid testing] the increase in boundary layer displacement over the flat plate surface caused by fluid flowoff during the AERODYNAMIC ACCEPTANCE TEST and correlated to transient loss of lift during takeoff with fluids. – See FLOWOFF, TRANSIENT AERODYNAMIC EFFECTS OF FLUIDS.[162] [SAE AIR6232]

brine, water with a high concentration of salt.[127] [Guide]

brining, the dissolution of a salt (e.g., sodium acetate, sodium formate) at high concentration in water.[127] [Guide]

Brix (°Brix), **1.** [chemistry] a scale of refraction, expressed in degrees from 0.00 to 100.00, that represents the concentration of a solution of sucrose in water. **2.** a scale of refraction, expressed in degrees, usable for any substance using a calibration curve for that substance. **3.** [aircraft deicing] a scale of refraction calibrated to the glycol concentration or freezing point of a deicing fluid. **4.** a scale of refraction named after Adolf F. W. Brix (1798-1870). – See CALIBRATION CURVE, REFRACTION.[188,195,216] [SAE AS6285, Schaschke, TC TP 14052]

Brookfield counter-rotating mixer, **1.** [aircraft anti-icing fluids] a laboratory instrument formerly used to shear thickened fluid before performing anti-icing performance (water spray endurance test and high humidity endurance test) according to AMS1428 from 1993 to 2007. **2.** the Brookfield counter-rotating mixer was replaced by the WARING BLENDER model 7012G as specified by AMS1428F in July 2007 as manufacturing of the Brookfield counter-rotating mixer was discontinued, making repair parts unavailable. [As of 2025, the Waring blender 7012G is also discontinued. The SAE G-12 ADF Committee is looking into finding a solution to this issue].[166] [SAE AMS1428F]

Brookfield viscometer, a brand of ROTATIONAL VISCOMETER.

bucket, [aircraft deicing unit] colloquial synonym for BASKET.

Buehler test, see SUCCESSIVE DRY-OUT AND REHYDRATION.

buffer, **1.** [chemistry] a solution that resists changes in pH when acid or alkali is added to it. **2.** [aircraft deicing] short for FREEZING POINT BUFFER.[152] [Rennie]

bulb thermometer, see definition 2 under THERMOMETER.

cabin crew, personnel, other than flightcrew members, assigned to passenger cabin safety duties for the flight; *federal inspectors and air security officers that also work aboard the aircraft are not flightcrew, but are not cabin crew per se as they do not always take direction from the airline crew members. Deadheading pilots and flight attendants are also considered to be working but not considered active cabin crew unless activated to relieve an ill or injured operating crew member.*[109,111] [Horrigan 2024, IATA]

calibration, the process of using known reliable standards, under set conditions, to relate to an experimentally observed value; *calibration of a pH meter, refractometer, viscometer, balance*.[33,127] [Bell, Guide]

calibration certificate, a document stating that an instrument has been calibrated and by whom, usually issued by the instrument manufacturer or a calibration laboratory.

calibration curve, **1.** a plot, graph, or equation of an instrument output (or reading or response) to samples of know concentration or known physical property. **2.** [aircraft deicing] a plot or equation of refraction (in °BRIX, °C or °F) vs known glycol content. **3.** [aircraft deicing] a plot or equation of refraction (in °Brix, °C or °F) vs know freezing point. – See PHYSICAL PROPERTIES.[28,127] [Atkins, Guide]

camber line, [aerodynamics] an imaginary curve constructed midway between the upper and lower surfaces of an AIRFOIL. – Synonym: MEAN CAMBER LINE.[28,198] [Atkins, Shevell]

cancelation date, see SAE STANDARD.

carbon brake, a brake that uses friction material composed of a carbon-carbon composite; this is usually in the form of a carbon fiber preform densified with additional carbon as matrix.[160] [SAE AIR5490]

carbon brake antioxidant treatment, see ANTIOXIDANT TREATMENT.

carbon brake friction and wear modifiers, see FRICTION AND WEAR MODIFIERS.

Cassie state, [surface chemistry] a WETTING condition in which a liquid droplet rests on a textured or rough surface, with air trapped beneath the droplet. In this state, the liquid does not come into direct contact with the solid surface but rather sits atop air pockets created by the surface roughness resulting in a hydrophobic or water repellency condition; *water beading on a lotus leaf is an example of a Cassie state*. – Compare WENZEL STATE.[162] [SAE AIR6232]

catalysis, **1.** [chemistry] the process of changing the rate of a chemical reaction with a catalyst. **2.** the effect of a substance (the catalyst) that, without undergoing change itself, aids a chemical change in other substances. – See CATALYST, CATALYTIC OXIDATION.[195,152] [Schaschke, Rennie]

catalyst, [chemistry] a substance that increases the rate of a chemical reaction without itself undergoing any permanent chemical change. – See CATALYSIS, CATALYTIC OXIDATION.[152] [Rennie]

catalytic oxidation, [aircraft brakes] oxidation of carbon brakes accelerated by a CATALYST. – See EFFECT ON CARBON BRAKE SYSTEMS.[160,161,213] [SAE AIR5490, SAE AIR5567, TC AV-2009-03]

category specification, **1.** [aircraft deicing fluids] a specification that defines which FREEZING POINT DEPRESSANTs are used in Type I or Type II/III/IV fluids and together with the foundation specification fully define Type I or Type II/III/IV fluids. **2.** AMS1424/1, AMS1424/2, AMS1428/1, and AMS1428/2 are the only category specifications. **3.** AMS1424 and AMS1428 are not category specifications. – Compare FOUNDATION SPECIFICATION.[165,167] [SAE AMS1424, SAE AMS1428]

causal chain, [root cause analysis] ordered sequence of actions and conditions that led an outcome or event of interest.[210] [TC AC SUR-002]

cause-and-effect diagram, see FISHBONE DIAGRAM.

central deicing facility (CDF), an area at an airport designated to manage deicing and anti-icing activities in a central location while fulfilling operational, safety, and environmental requirements.[84,175,216] [FAA AC 150/5300-14D, SAE ARP5660, TC TP 14052]

centralized deicing facility, see CENTRAL DEICING FACILITY.

Certificate Management Office (CMO), [FAA] an office of the FAA that specializes in the certification, surveillance, and inspection of major air carriers and Flight Safety International's part 142 Training Centers.[87] [FAA CMO]

certificate of analysis, a document, usually issued by a manufacturer, attesting that a LOT or BATCH of a product fulfills the manufacturer's SALES SPECIFICATION requirements, listing the tests, the test requirements, the test results on that lot or batch, the lot or batch number, and a date of manufacture. Laboratories other than the fluid manufacturer may also issue certificates of analysis. Plural is certificates of analysis. – Compare CERTIFICATE OF CONFORMANCE.[127,188] [Guide, SAE AS6285]

certificate of conformance, document declaring that a product fulfills the requirements of a standard. – Synonym: CERTIFICATE OF CONFORMITY. Compare CERTIFICATE OF ANALYSIS.[127,188] [Guide, SAE AS6285]

certificate of conformity, see CERTIFICATE OF CONFORMANCE (the usual term is certificate of conformance).[127,188] [Guide, SAE AS6285]

certificates of analysis, plural of certificate of analysis.[53] [Cambridge]

certification, **1.** [general] a formal recognition granted by an authoritative body that a product, system, or process has met predefined standards; *aircraft deicing fluids and* RUNWAY DEICING PRODUCT*s fulfilling the requirements of SAE AMS1424, AMS1428, AMS1431 and AMS1435 are not certified as there is no provision for an authoritative body to certify them.* **2.** [quality assurance] the process by which recognition is obtained from an appropriate party that a material, product, process, service or environment meets certain specified requirements. **3.** [human resources] formal approval by the appropriate certifying agency to function at a certain level of practice; *the certification of this teacher was revoked*; *this jurist cannot practice law before she is certified by the Law Society*. – See CERTIFIED. Compare QUALIFICATION.[20,50,165,167,168,169] [ASTM E699, Butterfield, SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435]

certified, a material, product, system, service, process or environment that has obtained certification. – See CERTIFICATION. Compare QUALIFIED.

check, **1.** to look at something to obtain information. **2.** examining work to ensure that it has been done correctly. **3.** [aircraft deicing] examination against a relevant standard by a trained and qualified person to ascertain satisfactory condition. – See PREFLIGHT CONTAMINATION CHECK, TACTILE CHECK, POSTDEICING/ANTI-ICING CHECK, PRETAKEOFF CHECK, PRETAKEOFF CONTAMINATION CHECK.[99,132,188] [Gorse, MW, SAE AS6285]

checktime, [holdover time nowcasting system] the output of an automated nowcasting system to support real time holdover time determination. Checktime is a time in the past that indicates whether an aircraft anti-icing fluid is still within holdover time in the given conditions. Incorporating real-time snowfall rates, ambient air temperature, and fluid type, the algorithm begins with the current time and integrates the fluid's loss in protection capacity rate backwards in time, minute by minute, until it determines sufficient precipitation has fallen for the fluid protection capability to be exhausted. The time at which this occurs is displayed to the user as the checktime and is updated every minute. The checktime is compared to the time when the aircraft was anti-iced. If the time the aircraft was anti-iced remains more recent than the checktime, the fluid is still within holdover time.[81,180] [FAA AC120-112, SAE AS5537]

chemical contamination, presence of substances (chemicals) where they should not be or are at concentrations higher than they should be. – See CONTAMINATION. Compare FROZEN CONTAMINATION.[188] [SAE AS6285]

chemical oxygen demand (COD), **1.** [environmental science] the amount of oxygen required to chemically oxidize organic and inorganic compounds in water. The test procedure is based on the chemical OXIDATION of the organic and inorganic contaminants dissolved or suspended in water. The quantity of oxidant (potassium dichromate) consumed is expressed in mg/L. **2.** a DETERMINE

AND REPORT TEST whose results are classified under ENVIRONMENTAL PROPERTY for Type I/II/II/IV fluids and RUNWAY DEICING PRODUCTs. – Compare BIOCHEMICAL OXYGEN DEMAND, TOTAL OXYGEN DEMAND, THEORETICAL OXYGEN DEMAND, BIODEGRADABILITY.[10,195] [Allaby, Schaschke]

chloride content, [solid runway deicing products] a PASS-FAIL TEST for solid RUNWAY DEICING PRODUCTs where the level of soluble chloride on a dry basis must not exceed 250 ppm as determined by the APHA method 4500-Cl or equivalent.[204,168] [APHA 4500-Cl, SAE AMS1431]

chord, [aerodynamics] the length of the CHORD LINE.[28,85,198] [Atkins, FAA H-8083-3C, Shevell]

chord line, [aerodynamics] an imaginary straight line drawn between the LEADING EDGE and TRAILING EDGE of an AIRFOIL[28,85,198] [Atkins, FAA H-8083-3C, Shevell]

classification, **1.** the act or result of grouping things according to shared characteristics, properties, specific criteria, similarities or differences. **2.** [aircraft deicing fluids] the process of attributing the designation Type II, III, or IV to thickened fluids according to their AERODYNAMIC ACCEPTANCE TEST results and minimum ANTI-ICING PERFORMANCE, that is the WATER SPRAY ENDURANCE TIME and HIGH HUMIDITY ENDURANCE TIME.– See TYPE II/III/IV.[132,167,222] [MW, SAE AMS1428, U.S. Dictionary]

clean aircraft, **1.** an aircraft without any contamination or any fluid**. 2.** an aircraft with a fluid that has not failed. **3.** an aircraft without adhering contamination. **4.** an aircraft meeting the regulation and regulatory guidance requirements for takeoff with respect to frozen contamination taking into consideration specific allowable contamination, as defined under regulation and regulatory guidance, such as unfailed fluid, COLD SOAKED FUEL FROST within certain areas, THIN HOARFROST on the fuselage, or non-adhering FROZEN CONTAMINATION. – See FAILED FLUID, FLUID FAILURE, GUIDANCE, UNFAILED FLUID.

clean aircraft concept, regulatory compliance guidance consisting in an array of operational practices (called defenses in safety science) to ensure that crews and other operational persons understand the need to ensure that, before any takeoff is attempted, the aircraft is clean, meaning free from critical surface contamination as defined by regulations and regulatory GUIDANCE.[71,72,73,190,216,219] [Dekker 2011, Dekker 2014, Dekker 2019, SAE AS6332, TC TP 14052, TSB]

clean stormwater, **1.** normal runoff without noteworthy contamination. **2.** [aircraft deicing] stormwater with permissible/allowable glycol concentration. – See CONTAMINATED STORMWATER, STORMWATER.[172] [SAE ARP4902]

cleaning certificate, see WASH CERTIFICATE.

cleaning solvents, **1.** degreasers and paint stripping solvents that may become contaminants for aircraft brakes. **2.** [aircraft brakes] potential contaminants for carbon brakes.[160] [SAE AIR5490]

clear ice, **1.** [meteorology] glossy, clear, or translucent ice formed by large liquid water drops, rapid accretion of liquid water, slight supercooling and slow dissipation of the latent heat of fusion. In meteorology, also known as glaze or glaze ice. **2.** [aircraft deicing] a smooth and transparent coating of ice difficult to detect visually on aircraft critical surfaces. **3.** [aircraft deicing] a coating

of ice which may make the aircraft critical surfaces appear to be wet. **4.** [aircraft deicing] a form of ice that may occur in flight or on the ground. **5.** [aircraft deicing] a form of ice attributable to cold soaking or incomplete deicing. **6.** [aircraft deicing] a form of ice that may form from freezing or non-freezing precipitation on cold-soaked aircraft surfaces at OUTSIDE AIR TEMPERATUREs as high as 15 °C. **7.** [aircraft deicing] transparent layer of ice that forms when high humidity, cloud drops, fog, drizzle, or rain encounter objects below 0 °C. **8.** [aircraft deicing] a form of ice particularly difficult to detect at night or on a wet aircraft. **9.** [aircraft deicing] a form of ice whose detection may require a TACTILE CHECK or a GROUND ICE DETECTION SYSTEM. **10.** [aircraft deicing] a firmly adhering form of ice that is difficult to remove. **11.** [aircraft deicing] a form of ice that may break loose after takeoff, causing flameout or damage to aft-mounted engines or impact damage to aft critical surfaces, such as the horizontal stabilizer. – The meteorological synonyms are: GLAZE, GLAZE ICE (when on the aircraft the HARMONIZED TERM is clear ice). See COLD SOAKING, ACCRETION, SUPERCOOLING, LATENT HEAT OF FUSION. Compare RIME.[11,75,76,112,182,189,203,216] [AMS Glossary, EASA EU Reg, EASA SIB 2008-29, ICAO 9640, SAE AS5681, SAE AS6286, SIAGDP, TC TP 14052]

climb, [aerodynamics] gaining altitude. The climb phase normally follows takeoff and precedes cruise.[85] [FAA H-8083-3C]

cloud condensation nuclei, **1.** [meteorology] an aerosol particle forming a center for condensation under extremely high supersaturation. **2.** active nuclei at high supersaturation may coagulate to form larger particles that become condensation nuclei. **3.** process can be important for fog and freezing fog formation. – See SUPERSATURATION. Compare CONDENSATION NUCLEUS.[11] [AMS Glossary]

cockpit, **1.** [aircraft components] front part of an aircraft, particularly smaller aircraft, from which the pilot controls the aircraft. **2.** the cockpit in larger aircraft is usually called the flightdeck—although in civil aviation both cockpit and flightdeck are sometimes used interchangeably. – (FLIGHTDECK is a HARMONIZED TERM; cockpit is not).[197] [Harmonization]

cold corner, a term for the upper surface of a wing prone to ice or CLEAR ICE formation due to COLD SOAKING, typically in the fuel tank area. The cold corner area is well defined for some aircraft, such as the MD80s and MD90s.[216] [TC TP 14052]

cold front, [meteorology] any non-occluded front, which moves in such a way that colder air replaces warmer air at the surface. Boundary between two airmasses where the colder airmass is replacing the warmer airmass.– See AIR MASS.[74,203] [Dunlop, SIAGDP]

cold-soak effect, see COLD SOAKING.

cold-soaked fuel frost (CSFF), frost developed on cold-soaked aircraft surfaces by DEPOSITION (sometimes called DESUBLIMATION) of air humidity on the external surfaces of fuel tanks. – Synonym: NONENVIRONMENTAL FROST. See COLD-SOAKED SURFACE FROST.[188] [SAE AS6285]

cold-soaked surface frost (CSSF), frost developed on cold-soaked aircraft surfaces by deposition (sometimes called DESUBLIMATION) of air humidity. – Synonym: NONENVIRONMENTAL FROST. – SEE COLD-SOAKED FUEL FROST.[75,188] [EASA EU Reg, SAE AS6285]

cold soaking, **1.** a condition in which aircraft surfaces are cooled below ambient outside air temperature, which is caused by the aircraft flying at high altitude and descending into warmer air or having been refueled with very cold fuel or having been stationed for several hours in extreme cold followed by a warming of the ambient outside air temperature; *for example, in Calgary and Edmonton, aircraft on station overnight in extreme cold can experience a rapid rise in outside air temperature due to a warm humid wind (Chinook) resulting in non-flight related frost.* **2.** a condition conducive to the formation of ice, particularly frost (known as COLD-SOAKED SURFACE FROST or COLD-SOAKED FUEL FROST) or CLEAR ICE, on cold-soaked aircraft surfaces at OUTSIDE AIR TEMPERATURE well above (warmer than) 0 °C. **3.** a condition requiring the creation of holdover times for outside air temperature above 0 °C. **4.** cold soaking can result in aircraft surface temperature below the LOWEST OPERATIONAL USE TEMPERATURE of thickened and unthickened fluids.[112,135,188,203,216] [ICAO 9640, Myers, SAE AS6285, SIAGDP, TC TP 14052]

colligative property, [chemistry] said of properties of solutions that vary depending on the number of (collection of, concentration of) particles (molecules or ions) present in the SOLVENT rather than the kinds of particles. Freezing point depression, lowering of vapor pressure, osmotic pressure, and elevation of boiling point are examples of colligative properties. – See FREEZING POINT DEPRESSION.[127,152] [Guide, Rennie]

color, **1.** [science] the sensation produced when light of different wavelengths falls on the human eye. **2.** [aircraft deicing fluids] an OPERATIONAL PROPERTY of Type I (orange), Type II (yellow), Type III (bright yellow), and Type IV (green). **3.** color is imparted to aircraft deicing fluids to instantly identify the fluid Type and to facilitate application. **4.** [thickened fluids] insufficient color intensity of Type II/III/IV can lead to an undesirable condition called BLEED-THROUGH. **5.** aircraft deicing fluids are generally formulated on purpose with dyes that fade in sunlight. **6**. [runway deicing products] a PHYSICAL PROPERTY of liquid runway deicing product (uncolored or optional blue) and solid runway deicing product (uncolored or optional blue). **7.** the color and its uniformity is verified when checking for APPEARANCE for deicing fluids and runway deicing products.[123,165,167,168,169] [Law, SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435]

commingling, the mixing or combination of two different fluids.[127] [Guide]

commuter turboprop aircraft, see LOW SPEED AIRCRAFT.

compacted snow, [runway contaminant] snow compressed and consolidated into a solid FORM that resists further compression such that an aircraft will remain on its surface without displacing any of it.[83] [FAA 150/5200-30D]

complete plate failure, a fluid testing scenario in which 100 percent of the standard plate has reached a VISUAL FAILURE condition. – Synonyms: ENTIRE PLATE FAILURE, FULL PLATE FAILURE, TOTAL PLATE FAILURE.[135] [Myers]

compliant spent deicing fluid, fluid with glycol concentrations less than environmental guidelines or regulations that can be sent to a STORMWATER system (compliance depends on environmental regulations which are jurisdiction dependent). – See SPENT DEICING FLUID.[172] [SAE ARP4902]

composite test plate, see STANDARD COMPOSITE TEST PLATE.

composition-of-matter specification, a standard that establishes the physical and chemical makeup of a formulation, detailing its components, proportions, and how they interact. This specification focuses on what the material is made of, ensuring consistency in formulation and properties, leaving little latitude to the formulator to achieve greater performance with the formulation. An example of a composition-of-matter specification was the (now cancelled) U.S. military specification MIL-A-8243D "Anti-Icing and Deicing-Defrosting Fluids". The MIL-A-8243D Type I fluid had to be formulated with propylene glycol (88% minimum), water (9.0-10.0%), dibasic potassium phosphate (0.9-1.1 %) as the buffer, and sodium salt of tolyltriazole (0.5-0.6%) to prevent electrochemical dehydration. The formulated product had to meet a number of physical properties (pH, specific gravity, pour point, flash point) and a few effects on materials tests (corrosiveness and effect on acrylics). – Compare PERFORMANCE SPECIFICATION.[221] [MIL-A-8243D]

concentrate, **1.** something concentrated. **2.** [aircraft deicing] a form of Type I fluid usually containing 80, 88 or 92 percent glycol by weight and that must be DILUTED before use; *TYPE I CONCENTRATE*. **3.** [aircraft deicing] the word concentrate is not used to describe Type II/III/IV. – Compare TYPE I READY-TO-USE, NEAT, UNDILUTED.

condensation, the phase change from vapor or gas to liquid accompanied with the release of LATENT HEAT. The opposite of EVAPORATION.[152,195,203] [Rennie, Schaschke, SIAGDP]

condensation nucleus [meteorology], any particle, solid or liquid, facilitating condensation of water vapor to water droplets. – Compare FREEZING NUCLEUS. See NUCLEATION, NUCLEUS, CLOUD CONDENSATION NUCLEI.[44,74] [Britannica, Dunlop,]

conditions conducive to aircraft icing on the ground, any conditions which may result in freezing or frozen contamination on aircraft.[75,76] [EASA EU Reg, EASA SIB 2008-29]

conditions conducive to airframe icing in-flight, see IN-FLIGHT ICING CONDITIONS.

confirmation bias, [safety science] tendency to seek (pay attention to) information that confirms what one already believes to be true (based on memory), while, at the same time, ignoring (paying less attention to) or discounting information that is inconsistent with beliefs (perceiving it as less significant). – See PLAN CONTINUATION BIAS, HINDSIGHT BIAS.[219] [TSB]

conformity, the fulfillment of a requirement or standard.[190] [SAE AS6332]

contact angle, **1.** [surface chemistry] a measurement of WETTING. **2.** at a gas-liquid-solid interface, the angle that the tangent to the liquid surface makes with the solid surface at the point of contact. **3.** at angles of 90˚ or more the liquid is said to wet the surface. – Synonym: WETTING ANGLE. See ADVANCING CONTACT ANGLE, RECEDING CONTACT ANGLE.[28,119,162,195] [Atkins, Krüss, SAE AIR6232, Schaschke]

contact angle hysteresis, [surface chemistry] the difference between the advancing and receding contact angles.[162] [SAE AIR6232]

contact line, **1.** [surface chemistry] the gas (air) liquid (e.g., deicing fluid) solid (e.g., aircraft surface) interface as a drop of liquid spreads on a surface. **2.** a contact line may advance, recede or be stationary.

contaminant, [runway contaminant] a deposit, such as frost, any snow, slush, ice, or water, on an airport pavement where the effects could be detrimental to the friction characteristics of the pavement surface. – Compare CONTAMINATION.[83] [FAA AC 150/5300-30D]

contaminated runway, [runway contaminant] for purposes of condition reporting and airplane performance, a runway is considered contaminated when more than 25 percent of the runway surface area (within the reported length and width being used) is covered by frost, ice, and any depth of snow, slush, or water. – See CONTAMINANT. [83] [FAA AC 150/5300-30D]

contaminated stormwater, [aircraft deicing] stormwater containing deicing products above allowable/permissible levels.[172] [SAE ARP4902]

contamination, **1.** [aircraft deicing] any forms of frozen or semi-frozen deposits on an aircraft, such as frost, snow, slush, ice, ice pellets or hail within a fluid, frozen fluid or semi-frozen fluids (collectively referred to as FROZEN CONTAMINATION or simply contamination). **2.** [chemistry] substances (chemicals) present where they should not be or are at concentrations higher than they should be (referred to as CHEMICAL CONTAMINATION or simply contamination).[82,182,188,190,216] [FAA AC 120-60B, SAE AS6332, SAE AS6285, SAE AS6681, TC TP 14052]

contamination check, see PREFLIGHT CONTAMINATION CHECK (the HARMONIZED TERM is preflight contamination check).

continuation bias, see PLAN CONTINUATION BIAS.

contract weather observer, [meteorology] a human observer located at an airport who can report weather conditions at the airport or augment/correct observations reported by an automated weather station. – See AUTOMATED SURFACE OBSERVING SYSTEM, AUTOMATED WEATHER OBSERVING SYSTEM.[124] [Landolt 2025]

control point, where transfer of control of an aircraft occurs between controlling agencies.[175] [SAE ARP5660]

convective cloud, [meteorology] a could that owes its vertical development to convection, that is the vertical transport of heat and other properties through vertical mass motion.[11,74] [AMS Glossary, Dunlop]

conventional glycol, SEE GLYCOL (CONVENTIONAL).

corrective action, **1.** activities to address non-compliance and eliminate the causes of non-compliance to prevent recurrence. **2.** a reactive process to address concerns or issues after they have occurred.[190,210] [SAE AS6332, TC AC SUR-002]

corrective action plan (CAP), a plan submitted in response to findings outlining how it proposes to address findings and ensure on-going compliance.[210] [TC AC SUR-002]

corrosion of AMS5886 nickel alloy, [aircraft deicing fluids] a high temperature (1040 °C) corrosion PASS-FAIL TEST for NON-GLYCOL based Type I/II/III/IV fluids to indicate if such fluids could cause corrosion in jet engines.[165,167,170] [SAE AMS1424, SAE AMS1428, SAE AMS5886]

corrosion of low-embrittling plate, 1. [aircraft materials] a method used in aviation to evaluate the corrosive effects of aircraft maintenance chemicals on cadmium plating applied to high-strength steel components. This test is significant because cadmium plating is used to protect steel parts from corrosion while minimizing the risk of HYDROGEN EMBRITTLEMENT, which can weaken the material. The test involves immersing cadmium-plated specimens in the maintenance chemicals under controlled conditions. The effects are assessed by measuring weight changes in the specimens and conducting visual inspections for signs of corrosion or damage. **2.** [aircraft deicing fluids and RUNWAY DEICING PRODUCTs] a PASS-FAIL TEST classified under MATERIALS COMPATIBILITY and performed according to ASTM F1111.[27,165,167,168,169] [ASTM F1111, SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435]

crawling, **1.** [surface chemistry] the phenomenon where a liquid coating or film retracts from a surface, leading to uneven coverage or exposed areas. This occurs due to poor wetting or hydrophobic surface contamination. **2.** [aircraft deicing fluids] an undesirable phenomenon where the deicing fluid retracts from the treated surface. Crawling can occur due to surface hydrophobic contamination or poor WETTING properties of the deicing fluid caused by an ineffective surfactant or hydrophobic contamination within the fluid. – See FILM BREAKS, FISHEYES, WETTING FAILURE.[113] [Interlux]

crazing, a characteristic of some polymers, whereby fine crack-like defects that produce bright reflections appear on loading. They are not true cracks, rather regions of highly plastically deformed material interspersed with voids. Crazing is an underlying mode of polymer fracture.[28,103] [Atkins, Greenhalgh]

critical angle of attack, [aerodynamics] the angle of attack at which a wing stalls regardless of airspeed, flight attitude or weight. – See ANGLE OF ATTACK.[85] [FAA H-8083-3C]

critical component, a component which could adversely affect the mechanical or aerodynamic function of an aircraft. – See CRITICAL SURFACE.[188,189,190] [SAE AS6285, SAE AS6286, SAE AS6332]

critical ice contamination, ice contamination which leaves little or no aerodynamic lift or control margin and results in an aircraft accident. The amount, type (e.g., frost, clear ice) and spatial distribution of the contamination that is classified as critical is dependent on several variables including aircraft type and aircraft conditions at takeoff.[182] [SAE AS5681]

critical surface, **1.** the wings, control surfaces, rotors, propellers, HORIZONTAL STABILIZER, VERTICAL STABILIZER or any other stabilizing surface of an aircraft, or any other critical surface identified in the aircraft flight manual. **2.** any surface which could adversely affect the mechanical or aerodynamic function of an aircraft. **3.** there can be divergences in critical surface lists across different regulators. – See CRITICAL COMPONENT.[112,188,189,214,216] [ICAO 9640, SAE AS6285, SAE AS6286, TC 622.11, TC TP 14052]

crosshair, [fluid testing] a marking on a STANDARD TEST PLATE. – See FOURTH CROSSHAIR FAILURE, FIFTH CROSSHAIR FAILURE.

decision making, [safety science] a cognitive process that involves identifying and choosing a course of action from several alternatives. Decision making for pilots occurs in a dynamic environment and includes four steps: gathering information, processing information, making a decision, and acting on that decision.[13,219] [APA, TSB]

defrosting, the removal of frost, from an aircraft CRITICAL SURFACES, and their subsequent protection (the usual terms are DEICING or DEICING/ANTI-ICING).[216] [TC TP1402]

degree-specific holdover time, the holdover time calculated at degree decrements beginning at 3 °C down to the aircraft deicing/anti-icing fluid LOWEST OPERATIONAL USE TEMPERATURE.[209] [TC AC 700-061]

degree-specific holdover time data presentation, the method or means by which the data from the degree-specific holdover time database is presented in its final and verified form to the end user of the data, such as a modified paper holdover time table, an electronic presentation of a holdover time table, or an electronic application in an electronic flight bag.[209] [TC AC 700-061]

deicing, **1.** process to remove frozen contamination, excluding anti-icing; *first-step deicing* **2.** process to remove ice, snow, slush or frost from an aircraft's critical surfaces, by mechanical means, by the use of heat, or by the use of a heated fluid or a combination thereof. **3.** process to remove or prevent frozen contamination; *deicing unit, deicing vehicle.* **4.** the processes related to deicing an aircraft, including PREFLIGHT CONTAMINATION CHECK, deicing, anti-icing, POST DEICING/ANTI-ICING CHECK, communications with flightcrew, and dispatch; *for example, aircraft ground deicing*.[75,82,135,181,182,214,216] [EASA EU Reg, FAA AC 120-60B, Myers, SAE AS5635, SAE AS5681, TC TP 14052]

deicing/anti-icing, the combination of deicing and anti-icing performed in either one or two steps. – See DEICING, ANTI-ICING.[75,135,188] [EASA EU Reg, Myers, SAE AS6285]

deicing and anti-icing fluids, the fluids used to conduct deicing and anti-icing procedures.[176] [SAE AS5718]

deicing bay, specific area of a deicing facility where the deicing and/or anti-icing of aircraft is performed.[175] [SAE ARP5660]

deicing boot, **1.** [aircraft component, in-flight ice protection system] an IN-FLIGHT DEICING ICE PROTECTION SYSTEM comprising a flexible membrane (e.g., rubber) installed on some propeller-driven aircraft wing leading edges that inflate and deflate, shedding ice accreted in flight. **2.** deicing boots are regularly treated with specially designed products (e.g. Goodrich ICEX™ II ice adhesion inhibitor) that, if they spread to the wing surface, may interfere with the WETTING properties of deicing/anti-icing fluids. **3.** in-flight ICE PROTECTION SYSTEMs are not designed to perform ground deicing/anti-icing. – See ACCRETION, ACCRETION ICE. Synonym: PNEUMATIC BOOT. Compare BLEED AIR ICE PROTECTION SYSTEM.[85,98,104] [FAA H-8083-3C, Goodrich, Hansard]

deicing coordinator, the person who controls movement of aircraft and coordinates the deicing/anti-icing activities of deicing vehicles on a deicing pad or, if appropriate, procedures and/or technology for safe separation of deicing/anti-icing operation and communication on multiple deicing bays.[175,189] [SAE ARP5660, SAE AS6286]

deicing crew, **1.** personnel assigned to duty for an individual piece of deicing equipment. **2.** personnel assigned to duty for deicing an aircraft. – Compare FLIGHTCREW, CABIN CREW.[175] [SAE ARP5660]

deicing event, **1.** a series of actions required to deice and check after deicing an aircraft for contamination, culminating with the release of that aircraft compliant with the ground icing regulatory requirements; *the deicing event for flight 870 took eight minutes*. **2.** occurrence of deicing several aircraft over hours or days at a location; *this deicing event lasted two days*.[182] [SAE AS5681]

deicing facility, **1.** airport facility designed to conduct aircraft deicing/anti-icing operations while fulfilling operational, safety, and environmental requirements. **2**. generic term for any deicing facility including CENTRAL DEICING FACILITY, DESIGNATED DEICING FACILITY, REMOTE DEICING FACILITY, TERMINAL DEICING FACILITY, DEICING BAY.[84,172,175,216] [FAA AC 150/5300-14, SAE ARP4902, SAE ARP5660, TC TP 14052]

deicing fluid, **1.** a fluid applied to an aircraft to remove frozen contamination. **2.** a fluid consisting of a) heated water, b) a heated mixture of water and TYPE I CONCENTRATE, c) heated TYPE I READY-TO-USE, d) heated TYPE II/III/IV UNDILUTED, or e) heated mixture of water and Type II/III/IV. **3**. collective name for deicing and anti-icing fluids; *these are the deicing fluid storage tanks*.[75,76,81,188,216] [EASA EU Reg, FAA AC 120-112, SAE AS6285, TC TP 14052]

deicing fluid blender, **1.** [aircraft deicing] colloquial term to designate equipment to mix a fluid with water or mix the same fluid at different concentration to achieve a target concentration (or freezing point) dictated by several factors including the aircraft type (high speed, middle speed, low speed), OUTSIDE AIR TEMPERATURE, LOWEST OPERATIONAL USE TEMPERATURE, and HIGHEST OPERATIONAL USE CONCENTRATION. **2.** the blending system can be stand-alone or part of a DEICING VEHICLE in which case it is referred to as in-truck proportional mixing. – Compare IN-TRUCK PROPORTIONAL MIXING.[165,167] [SAE AMS1424, SAE AMS1428]

deicing instructor, person with demonstrated competence in the deicing/anti-icing subjects to be instructed and with the skills to deliver the training effectively.[189] [SAE AS6286]

deicing operator, qualified person performing deicing/anti-icing operations and associated CHECKs.[175] [SAE AS5660]

deicing pad, **1.** operational area within a DEICING FACILITY, including taxiways, taxi lanes, STAGING BAYs, and DEICING BAYs, controlled by the ICEHOUSE. **2.** an area on a deicing facility where aircraft receive deicing and/or anti-icing treatment generally consisting of an inner area for positioning an aircraft to receive the deicing/anti-icing treatment and an outer area providing sufficient width for the safe maneuvering of deicing vehicles during deicing [definition 2 is synonymous with DEICING BAY].[84,172,175,216] [FAA AC 150-5300-14D, SAE ARP4902, SAE ARP5660, TC TP 14052]

deicing personnel, groundcrew personnel with roles and responsibilities associated with aircraft ground icing operations.[188] [SAE AS6285]

deicing season, 1. predetermined period at an airport when deicing/anti-icing services are readily available, as opposed to when advance notification is required to receive these services; *the deicing season at the Toronto Pearson International Airport is from October 1 to April 30.* **2.** period when there may be deicing at a given airport. – Compare OFFSEASON.[101] [GTAA 2024]

deicing service provider, see SERVICE PROVIDER.

deicing supervisor, person supervising deicing operations.[189] [SAE AS6286]

deicing truck, see DEICING VEHICLE.

deicing unit, a term encompassing fixed, mobile (deicing vehicle) and towed equipment used in deicing operations. – See DEICING VEHICLE.[127] [Guide]

deicing vehicle, a mobile vehicle used in deicing operations to dispense deicing and anti-icing fluids and/or to perform check for the presence of frozen contamination. – See DEICING UNIT.

deicing vehicle driver, person driving a DEICING VEHICLE and performing related communications.[189] [SAE AS6286]

deicing/anti-icing, [aircraft deicing] a combination of deicing and anti-icing performed in either one or two steps. – See DEICING, ANTI-ICING.[75,76,112,188] [EASA EU Reg, EASA SIB 2008-29, ICAO 9640, SAE AS6285]

deicing/anti-icing fluid, **1.** FREEZING POINT DEPRESSANT solution applied to the exterior of an aircraft for the purpose of removing and protecting against frozen contamination prior to takeoff. **2.** [aircraft brakes] potential source of contamination for carbon brakes.[160] [SAE AIR5490]

deliquescence, **1.** [chemistry] the process by which a hygroscopic solid absorbs water from the atmosphere to such that it forms a concentrated solution of the solid, thereby becoming a liquid. **2.** one of the pass-fail criteria of solid runway deicing products in the storage stability test.[152,168] [Rennie, SAE AMS1431]

deposition, **1.** [meteorology] the process by which water vapor changes directly to a solid (ice) without going through a liquid phase. **2.** [chemistry] the process by which a vapor changes directly to a solid without going through a liquid phase. In chemistry deposition is sometimes called DESUBLIMATION. – Compare SUBLIMATION.[74] [Dunlop]

deposition nucleus, [meteorology] a solid particle suspended in air that nucleates an ice crystal directly from water vapor. – Synonym: ICE NUCLEUS. See ICE CRYSTALS.[11,74] [AMS Glossary, Dunlop].

descriptor, [meteorology] qualifiers that further describe current weather phenomena and are used with certain types of precipitation and OBSCURATIONs in METAR CODEs. The descriptor qualifiers are shallow (MI), partial (PR), patches (BC), low drifting (DR), blowing (BL), shower(s) (SH),

thunderstorm (TS), and freezing (FZ); *freezing rain (FZRA), blowing snow (BLSN), freezing drizzle (FZDZ)*. – Synonym: METAR DESCRIPTOR.[56,142] [MANOBS, NOAA FMH-1]

designated deicing facility (DDF), collectively one or multiple designated airport infrastructure facilities, such as a central deicing facility or remote deicing facilities, designed to conduct deicing/anti-icing of aircraft while fulfilling operational, safety, and environmental requirements.[175] [SAE ARP5660]

desktop procedure, [documentation**,** procedures] a detailed, step-by-step document outlining how specific tasks or activities should be performed by an employee or department. It serves as a guide to ensure consistency, accuracy, and efficiency in completing work-related processes–and can also be used for training. Typically the elements of a desktop procedure are: title, header (division, department, version number, approval date, procedure owner), table of contents, purpose, scope (overview of the procedure), definitions (including acronyms), responsibilities (list of roles and job titles), detailed procedure, controls (list of controls associated with the procedure), document retentions (what documentation gets produced and retained, where kept and for how long), audit procedure (how the procedure itself is audited), references (e.g., job aids, flow charts, external documents, etc.), and revision history (list of changes and approvers).[15,97,134] [APCQ, Ghosh, Murray]

desublimation, see DEPOSITION.

determine and report test, [aircraft deicing fluids, runway deicing products] a type of test intended to make data available to the purchaser for evaluation and comparison against competitive products. The VENDOR and PURCHASER may agree on acceptance criteria for determine and report test results. *Examples of these tests are biochemical oxygen demand, chemical oxygen demand, biodegradability, aquatic toxicity, trace contaminants, ice melting test, ice undercutting test, ice penetration test, and effect on carbon brake systems*. – Compare PASS-FAIL TEST, MANDATORY INFORMATION.[165,167,168,169] [SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435]

dew, [meteorology] water droplets formed by CONDENSATION of water vapor from the air on objects near the ground whose temperature is below the DEWPOINT of the surface air due to RADIATIONAL COOLING at night, but remains above freezing temperature. – See FROST, FROST POINT, FROZEN DEW.[74] [Dunlop]

dewetting, **1.** [surface chemistry] the rupture of a liquid film on a solid surface. **2.** [aircraft deicing] the lack of uniform coverage of a deicing fluid generally due to hydrophobicity of the surface or chemical contamination of the deicing fluid. – Compare WETTING.[28] [Atkins]

dewpoint, [meteorology] the temperature at which unsaturated air must be cooled, at constant barometric pressure and constant water vapor content, to cause SATURATION to occur with respect to liquid water. – Compare FROST POINT. See SATURATION MIXING RATIO OVER WATER.[88,188,203,216] [FAA General Information, SAE AS6285, SIAGDP, TC TP 14052]

diamond dust, see ICE CRYSTALS.

diethylene glycol, **1.** [chemistry] Chemical Abstract registry number 111-46-6, alternate names: 2,2'-oxybisethanol; 2,2'-oxydiethanol; DEG; molecular formula $C_4H_{10}O_3$; mol wt 106.12; bp 244-

245 °C. **2.** [aircraft deicing] a FREEZING POINT DEPRESSANT rarely used in the formulation of aircraft deicing/anti-icing fluids. – Compare ETHYLENE GLYCOL, PROPYLENE GLYCOL.[144] [Merck Index]

dilute, synonym for DILUTED.

diluted, **1.** weakened or thinned by having been mixed with something else, such as water. **2.** [aircraft deicing fluids] said of TYPE I CONCENTRATE or TYPE II/III/IV UNDILUTED to which water has been added. – Synonym DILUTE. See TYPE I DILUTED, TYPE II/III/IV (75/25), TYPE II/III/IV (50/50).

dilution failure, [aircraft deicing fluid failure] a visual mode of fluid failure that occurs under snow conditions when the fluid erodes and thins due to incoming snow, runs off because of dilution, and snow starts to accumulate. Dilution failures typically occur from the upper to lower sections of test surfaces or wings. Dilution failures are common at warm temperatures and low rates of precipitation. – Compare SNOW-BRIDGING FAILURE. See FLUID FAILURE, FLUID FAILURE CRITERIA, VISUAL FAILURE, FLUID FAILURE MECHANISM.[177] [SAE ARP5945]

dimensionless quantity, [metrology] quantities that do not have associated physical units or dimensions where all units cancel out such as mass fraction, REFRACTIVE INDEX, REYNOLDS NUMBER, and Mach number. [French: grandeur sans dimension].[116] [JCGM]

dimpled snow, surface of snow that has small indentations or dimples, often resembling the surface of a tufted mattress. This phenomenon occurs when the snow melts unevenly due to variations in factors like location, terrain, and air movement. The dimples are essentially areas where the underlying structure of the snow collapses.

discrepancy, **1.** a difference or inconsistency between two things that should align or match. **2.** SAE AS6285 requires service providers and fluid manufacturers to have procedures to deal with nonconformities, anomalies, discrepancies, and irregularities. – Compare ANOMALY, DISCREPANCY, IRREGULARITY, NONCONFORMITY. [53,188] [Cambridge, SAE AS6285]

disinfectants, **1.** products to destroy, inactivate or reduce the concentration of pathogens to limit the spread of diseases. **2.** [aircraft brakes] a potential contaminant for carbon brakes.[160] [SAE AIR5490]

dissolution, [chemistry] the process of dissolving a SOLUTE in a SOLVENT; *the dissolution of sodium acetate in water*. – Compare LIQUEFACTION.[127] [Guide]

distributor, **1.** [chemical industry] an entity that purchases products from manufacturers, stores them, repackages if needed, and sells them to end-user customers. They are valuable in the supply chain as they extend the reach of manufacturers. **2.** distributorship is normally set up by a contract between the manufacturer and distributor stipulating the parties involved, term and termination, products and specifications, price, currency, payment terms, freight terms, territory, exclusivity/non-exclusivity, performance metrics, confidentiality, warranty and liability, use of trademarks and patents, force majeure clauses, safety and responsible care clauses, and governing law. – Compare VENDOR, PURCHASER, LICENSEE.[44] [Britannica]

domain, [psychology–system model of creativity] the cultural context or body of knowledge within which creativity occurs. It includes the rules, guidelines, expertise, conventions, and symbolic systems (like art, science, or music) that define a particular area of expertise or area of human activity. *The domain of music includes musical theory, notation, scales, modes, phrasing, time signatures, tempos, chord notation and progression, key signatures, styles, performances, etc.; the domain of chemistry includes all the knowledge, skills, and techniques related to creating and understanding chemical reactions and substances; the domain of aircraft ground deicing includes all knowledge, skills and techniques to perform aircraft deicing.* – Compare FIELD.[65] [Csikszentmihalyi]

drag, **1.** [aerodynamics] an aerodynamic force acting on the aircraft (or body) in a direction opposite its motion through the air. Drag depends on the density of the air, the square of the velocity, the air viscosity and compressibility, the size and shape of the body, and the body's inclination to the flow. **2.** one of the main four forces acting upon an aircraft, the others being LIFT, THRUST, and WEIGHT.[28,85,136,198] [Atkins, FAA H-8083-3C, NASA Drag, Shevell]

drizzle, [meteorology] uniform liquid precipitation composed of fine water droplets less than 0.5 mm but larger than 100 µm in diameter that appears to float while following air currents but eventually falls to the ground, unlike fog droplets that remain suspended in the air. Drizzle usually falls from low stratus clouds and is frequently accompanied by low visibility. Drizzle intensities are defined as light (-DZ) (the rate of fall from a trace to 0.3 mm (0.01 in.) h^{-1}), moderate (DZ) (the rate of fall from 0.3–0.5 mm (0.01–0.02 in.) h^{-1}), and heavy (+DZ) (the rate of fall greater than 0.5 mm (0.02 in.) h^{-1}). See FREEZING DRIZZLE.[74,112,142,188] [Dunlop, ICAO 9640, NOAA FMH-1, SAE AS6285]

dry disconnect coupling, [chemical industry] a type of coupler designed for spill-free loading of liquids during connection or disconnection.

dry runway, [runway contaminant] a runway that is neither wet, nor contaminated.[83] [FAA AC150-52-30D]

dry snow, snow that has insufficient liquid water to cause it to stick together; this kind of snow occurs generally at temperatures below -5 °C (23 °F).[83,112] [FAA AC150/5200-30D, ICAO 9640]

dry-out exposure to cold dry air, **1.** [thickened fluids] a test to simulate the effect of cold dry air (1 °C, 40% RELATIVE HUMIDITY) on Type II/II/IV fluids for 24 hours and their propensity to form residues. **2.** a PASS-FAIL TEST in the INITIAL QUALIFICATION of Type II/II/IV fluids and classified as an OPERATIONAL PROPERTY. – See FLUID RESIDUE. Compare SUCCESSIVE DRY-OUT AND REHYDRATION.[167] [SAE AMS1428]

edge effect, [aircraft deicing fluid testing] a phenomenon where fluid drains irregularly along the edges of a test panel during the water spray endurance time test and the high humidity endurance test. This irregular drainage along the vertical edges of test plates results in inconsistent ice formation, leading to non-reproducible tests. Consequently, a section of 5 mm along the vertical edges of test panels was excluded to create the so-called FAILURE ZONE. Therefore, ice formation along the edges of a test panel does not constitute a failure.[184] [SAE AS5901]

effect on aircraft materials, see MATERIALS COMPATIBILITY.

effect on carbon brake systems, [runway deicing products] a DETERMINE AND REPORT TEST in which the runway deicing product is tested to measure its effect on the CATALYTIC OXIDATION of carbon brakes according to AIR5567.[161,168,169] [SAE AIR5567, SAE AMS1431, SAE AMS1435]

effect on painted surfaces, **1.** test method to determine of the effects of cleaning solutions and various chemical materials on painted aircraft surface **2.** [deicing fluids, runway deicing products] a PASS-FAIL TEST classified under MATERIALS COMPATIBILITY to evaluate the effect of aircraft deicing fluid or runway deicing products on painted aircraft surfaces according to ASTM F502.[24,165,167,168,169] [ASTM F502, SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435]

effect on transparent plastics, **1.** [aviation materials] test method to determine the CRAZING effect that a liquid or semi liquids will have on transparent acrylic plastic material. **2.** [aircraft deicing fluids, runway deicing, products] a PASS-FAIL TEST classified under MATERIALS COMPATIBILITY to evaluate the stress crazing effect of heated (65 °C) aircraft deicing fluids and runway deicing products on transparent stretched acrylates and polycarbonates and performed according to ASTM F484.[23,165,167,168,169] [ASTM F484, SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435]

effect on unpainted surfaces, **1.** test method to determine the effects of cleaning solutions and various chemical materials on unpainted aircraft surface **2.** [deicing fluids, runway deicing products] a PASS-FAIL TEST classified under MATERIALS COMPATIBILITY to evaluate the effect of aircraft deicing fluid or runway deicing products on unpainted aircraft surfaces according to ASTM F502.[24,165,167,168,169] [ASTM F502, SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435]

effective concentration 50% (EC_{50}), [ecotoxicity] the concentration that causes a specific effect such as immobilization in the test population (e.g., for *daphnia magna*). – Compare LETHAL CONCENTRATION 50%. See AQUATIC TOXICITY.

effective date, [SAE] see SAE STANDARD.

electroimpact ice protection system, **1.** an ICE PROTECTION SYSTEM using pulses of energy to produce rapid flexing movements of the aircraft skin surface thereby breaking the bond of accumulated ice; the shattered ice is then carried by the airflow. Use of this system is uncommon. **2** electroimpact ice protection systems are usually classified as a subset of IN-FLIGHT DEICING ICE PROTECTION SYSTEMs**.** – Compare ELECTROTHERMAL ICE PROTECTION SYTEM.[80,174] [FAA AC 91-74B, SAE ARP5624]

electrothermal ice protection system, **1.** an ICE PROTECTION SYSTEM where a surface is heated to a temperature above freezing to break the bond of accumulated ice. The shattered ice is then carried away by airflow. The surface is allowed to cool to allow ice to form, and the heat is activated again to shed the ice, thus repeating the cycle. **2.** such systems are used on propellers, helicopter rotors, wing and tail leading edges. **3.** INTERCYCLE ICE and RESIDUAL ICE can accrete on aircraft with electrothermal deicing systems. Typically, such systems also produce RUNBACK ICE behind a protected area. Because other parts of the aircraft, including part of the span of the wing, are not protected from ice, a drag increase from those areas will occur. **4.** electrothermal ice protection

systems are usually classified as a subset of IN-FLIGHT DEICING ICE PROTECTION SYSTEMs.– Compare ELECTROIMPACT ICE PROTECTION SYSTEM. See PROPELLER ELECTROTHERMAL ICE PROTECTION SYSTEM, ENGINE ELECTROTHERMAL ICE PROTECTION SYSTEM.[80, 174] [FAA AC 91-74B, SAE ARP5624]

elevator, **1.** [aircraft component] a horizontal moveable control surface part of the HORIZONTAL TAIL, normally hinged to the rear of the HORIZONTAL STABILIZER. **2.** movement of the elevator rotates the aircraft about its LATERAL AXIS, controlling PITCH.[85,198] [FAA H-8083-3C, Shevell]

elimination, see FLUID ELIMINATION.

emissivity, **1.** [thermal radiation] a measure of a material's ability to emit infrared energy. **2.** the ratio between the thermal energy emitted by a surface to that radiated by a BLACKBODY at the same temperature. The emissivity of a blackbody has a value of 1 while a perfect reflector of radiant energy has a value of 0; *for example. the emissivity of polished aluminum is 0.03 to 0.04, of water 0.95,of a white painted wing 0.9, of Type I covered wing 0.95*. **3.** the emissivity of different aircraft surfaces affects the rate of RADIATIONAL COOLING, thus impacting the temperature difference between specific surface areas and the OUTSIDE AIR TEMPERATURE. This is important in FROST formation. **4.** the symbol for emissivity is ε (epsilon). – See FROST FORMATION CHART.[28,68,195] [Atkins, Dawson 2003, Schaschke]

enclosed cab, short form for ENCLOSED CABIN**.**

enclosed cabin, [aircraft deicing unit] enclosed work platform mounted on a boom and used by deicing personnel to perform deicing/anti-icing or CHECKs on the aircraft or its components. – Compare BASKET.[101] [GTAA 2024]

enclosed cabin deicing unit, aircraft ground deicing equipment, self-propelled or towable, equipped with an ENCLOSED CABIN used to perform aircraft deicing/anti-icing and associated CHECKs.[101] [GTAA 2024]

enclosed operator's cabin, see ENCLOSED CABIN**.**

endothermic, **1.** [chemistry, thermodynamics] characterizes chemical reactions or physical processes that absorb heat from the surroundings. **2**. an endothermic reaction is a chemical reaction that absorbs heat from the surroundings; *photosynthesis is an endothermic reaction as the green plants absorb sunlight to synthesize products from carbon dioxide*. **3.** an endothermic process is a physical process that absorbs heat from the surroundings. – Compare EXOTHERMIC.[123,152] [Law, Rennie]

endurance time, **1.** [fluid testing] time that a fluid can resist defined precipitation and temperature conditions on standard flat plate tests, in the laboratory or in the field, until VISUAL FAILURE at a predefined level of frozen contamination occurs. **2.** time measured in tests described in ARP5485, ARP5945 and AS5901. **3.** visual failure time data on which REGRESSION ANALYSIS is performed to determine holdover times, excluding the data arising from the WATER SPRAY ENDURANCE TEST and HIGH HUMIDITY ENDURANCE TEST. – See STANDARD PLATE FAILURE.[81,135,162,173,176,177,178,216] [FAA AC120-112, Myers, SAE AIR6232, SAE ARP5485, SAE ARP5718, SAE ARP5945, SAE ARP6207, TC TP 14052]

endurance time regression analysis, a data analysis protocol used to analyze fluid endurance time data for the generation of holdover times for anti-icing fluids. – See ENDURANCE TIME.[81] [FAA AC120-112]

endurance time tests, **1.** tests performed a) to generate endurance time data used with REGRESSION ANALYSIS to produce HOLDOVER TIMEs and b) to measure anti-icing performance, that is the WATER SPRAY ENDURANCE TIME and HIGH HUMIDITY ENDURANCE TIME. **2.** endurance time test nomenclature and rate boundaries, in many cases, are different from the meteorologically accepted definitions. – See ENDURANCE TIME.[34] [Bendickson]

engine barrel icing, [aircraft engine icing] a jet engine icing condition where ice accumulates on the ACOUSTIC LINER of the ENGINE INLET. This may occur when the engine is idling on the ground and the anti-icing capacity of the engine is overwhelmed by a combination of frozen precipitation, high humidity and wind (e.g., snow with an intensity > 14 g /dm^2/h, RELATIVE HUMIDITY ≥ 65%, wind ≥ 20 knots). When breakaway thrust is applied the engine blades may slightly move forward and strike the ice, resulting in engine vibrations or fan blade damage. Fan blade damage requires expensive repairs. – See OPERATIONAL ICE. Compare GROUND-ACCUMULATED ICE.[48,108] [Brown, Horrigan 2013]

engine core, [aircraft engine] the central part of the engine where the combustion of fuel takes place. It includes the combustion chamber, turbine section, and other components involved in the generation of power.

engine icing, [aircraft engine icing] the accumulation of icing on exposed engine parts. The accumulation may occur in flight or on the ground. Engine icing can affect several parts of the engine such as the ENGINE INLET, ACOUSTIC LINER, SPINNER, FAN BLADES, NACELLE, etc. – See FAN BLADE ICING, GROUND-ACCUMULATED ICE, OPERATIONAL ICE, ENGINE BARREL ICING.

engine inlet, [aircraft engine] the opening at the front of the engine that allows air to enter the engine. It is part of the NACELLE structure and is positioned before the INLET DUCT. The engine inlet is susceptible to icing.

engine inlet electrothermal ice protection system, an ICE PROTECTION SYSTEM typically used on propeller driven aircraft. If activated early enough (as an anti-icing system), the system will limit ice bonding to the inlet but is not hot enough to be evaporative. If activated post accretion (as a deicing system), the thin heated leading edge of the inlet creates a fracture line for the accreted ice. Some is shed externally but what is inside the inlet is shed into the engine air inlet path. The systems rely on a secondary ice diversion, or bypass door, which lies at the bend of the airflow and must be actuated open while the ice protection system is in use. There is a performance penalty associated with the air lost to the bypass door. – See IN-FLIGHT DEICING ICE PROTECTION SYSTEM. Compare PROPELLER ELECTROTHERMAL ICE PROTECTION SYSTEM.[110] [Horrigan 2025]

engines-on deicing, the process of removing ice, snow, or frost from an aircraft while its engines remain running. Engines-on deicing requires special safety procedures for both the deicing crew and flightcrew and clear communications between them.[188,220] [SAE AS6285, TSB RAM]

entire plate failure, a fluid testing scenario in which 100 percent of the standard plate has reached a VISUAL FAILURE condition. – Synonyms: COMPLETE PLATE FAILURE, FULL PLATE FAILURE, TOTAL PLATE FAILURE.[135] [Myers]

environmental mitigation plan, [aircraft deicing] measures and strategies to minimize environmental impact of spent deicing fluid at an airport.

environmental property, **1.** [environmental science] characteristics that affect the environment impacting humans, organisms, and ecosystems. **2.** [deicing fluids] characteristics affecting organisms and ecosystems such as THEORETICAL OXYGEN DEMAND (ThOD), BIOCHEMICAL OXYGEN DEMAND (BOD), AQUATIC TOXICITY of the fully formulated fluids such as the EFFECTIVE CONCENTRATION 50% (EC_{50}) for *daphnia magna*) or LETHAL CONCENTRATION 50% (LC_{50}) for fathead minnows and rainbow trout, effect on biological treatment systems, mammalian toxicity (usually available from SAFETY DATA SHEETs), and trace contaminants. – Compare PHYSICAL PROPERTY, PERFORMANCE PROPERTY, OPERATIONAL PROPERTY. SEE FLUID PROPERTIES.[77,165,167] [EEA Glossary, SAE AMS1424, SAE AMS1428]

ethanol, **1.** [chemistry] Chemical Abstract registry number 64-17-5, alternate names: ethyl alcohol, absolute alcohol, anhydrous alcohol, dehydrated alcohol, ethyl hydrate, ethyl hydroxide; molecular formula C_2H_6O; mol wt 46.07, mp – 114.1 °C, bp 78.5 °C, flash point closed cup 13 °C, lower explosive limit in air 2.5% (v/v), flammable. **2.** [aircraft in-flight ice protection] a FREEZING POINT DEPRESSANT used in the formulation for freezing point depressant ice protection systems (weeping wing). **3.** isopropanol is never used as a freezing point depressant in ground aircraft deicing/anti-icing fluids because of its flammability.– Compare ISOPROPANOL, METHANOL, ETHYLENE GLYCOL.[144] [Merck Index]

ethylene glycol, **1.** [chemistry] Chemical Abstract registry number 107-21-1, alternate names: 1,2-ethanediol, EG, monoethylene glycol, MEG; molecular formula $C_2H_6O_2$; mol wt 62.07; bp 197.6 °C. **2.** [aircraft deicing] a FREEZING POINT DEPRESSANT used in the formulation of aircraft deicing/anti-icing fluids. **3.** [runway deicing products] a freezing point depressant used in the formulation of runway deicing products (rarely used in North America and Western Europe). **4.** [in-flight ice protection system] a freezing point depressant used in FREEZING POINT DEPRESSANT ICE PROTECTION SYSTEMs (also known as WEEPING WING). – Compare PROPYLENE GLYCOL, ETHANOL, METHANOL, ISOPROPANOL.[144] [Merck Index]

evaporation, [chemistry] the change of state from a liquid to a vapor at temperatures below the boiling point of the liquid.[152,195,203] [Rennie, Schaschke, SIAGDP]

evaporative ice protection system, a subset of IN-FLIGHT ANTI-ICING ICE PROTECTION SYSTEM that supplies sufficient heat to evaporate water droplets impinging on the heated surface; *for example, BLEED AIR ICE PROTECTION SYSTEM*. – Compare IN-FLIGHT DEICING ICE PROTECTION SYSTEM. See ICE PROTECTION SYSTEM. [80,174] [FAA AC 91-74B, SAE ARP5624]

exceptional adaptations, [safety science] deviations that occur in only rare or special circumstances. Individuals make such adaptations when they are problem solving in unusual situations in which they believe the known rules and procedures do not apply. – Compare ADAPTATIONS.[219] [TSB]

exhaust, [aircraft engine] the rear portion of the engine where the hot gases produced by combustion exit the engine. It is located at the aft end of the engine and can be seen at the rear of the NACELLE.

exposure to dry air, **1.** [thickened anti-icing fluids] a test for Type II/III/IV fluids to simulate the effect of overnight exposure to dry air. **2.** a PASS-FAIL TEST for Type II/II/IV fluids performed in INITIAL QUALIFICATION and classified as an OPERATIONAL PROPERTY.[167] [SAE AMS1428]

exothermic, **1.** [chemistry, thermodynamics] characterizes chemical reactions or physical processes that release heat to the surroundings. **2**. an exothermic reaction is a chemical reaction that releases heat to the surroundings; *the oxidation of methane and the burning of gasoline are exothermic reactions*. **3.** an exothermic process releases heat to its surroundings. – Compare ENDOTHERMIC.[123,152] [Law, Rennie]

FAA/Transport Canada lists of fluids, **1.** lists published by the FAA or Transport Canada in their *Holdover Time Guidelines* which include fluids tested for ENDURANCE TIMEs, ANTI-ICING PERFORMANCE and AERODYNAMIC ACCEPTANCE, without regulator verification that other requirements (MATERIALS COMPATIBILITY tests, aquatic toxicity tests and various other tests) required under SAE AMS1424 or SAE AMS1428 have been performed [as of August 2024, the FAA and Transport Canada lists of fluid are identical]. **2.** it is the user's responsibility to verify that all technical requirements of AMS1424 or AMS1428 are fulfilled. **3.** the fluids on these lists are intended for use with the holdover time guidelines published in the FAA and Transport Canada *Holdover Time Guidelines*. **4.** The FAA/Transport Canada lists of fluids provides for each fluid, as applicable, the FREEZING POINT DEPRESSANT used in the fluid, the fluid QUALIFICATION EXPIRY DATE, concentration (fluid/water ratio), LOWEST OPERATIONAL USE TEMPERATURE for low speed, middle speed and high speed ramps at the stated concentrations, the LOWEST ON-WING VISCOSITY and the HIGHEST ON-WING VISCOSITY. – See LIST OF FLUIDS TESTED FOR ANTI-ICING PERFORMANCE AND AERODYNAMIC ACCEPTANCE, HOLDOVER TIME, HOLDOVER TIME GUIDELINES. Compare LIST OF VALIDATED FLUIDS.[89,176,178,212] [FAA HOT, SAE ARP5718, SAE ARP6207. TC HOT]

failed fluid, **1.** fluid that has reached the fluid failure condition. **2.** an OFF SPEC fluid. – See FLUID FAILURE, FLUID FAILURE CRITERIA. Compare UNFAILED FLUID.[127,135] [Guide, Myers]

failure adhesion, the point at which ice crystals in a fluid bond to the surface, this occurs when the diluted fluid freezing point rises above the surface temperature at a NUCLEATION SITE on the surface.[135] [Myers]

failure front, see FLUID FAILURE FRONT.

failure zone, **1.** [aircraft deicing fluid testing] a test plate for the WATER SPRAY ENDURANCE TEST and the HIGH HUMIDITY ENDURANCE TEST has a width of 100 mm, a height of 300 mm and a thickness of 1.6 mm. The surface area excluding 25 mm below the upper edge and 5 mm on either side of the plate is defined as the failure zone. When the ice front touches the failure zone or if there is slush over 10% of the surface of the failure zone, a failure is called. The 5 mm width on each side of the plate is excluded from the failure zone because it was recognized early on that fluid along the edges can thin out irregularly leading to irregular ice formation and irreproducible

results. The effect of the panel edge on the drainage of fluid from the test panel is known as the EDGE EFFECT.[184] [SAE AS5901]

fan blade icing, [aircraft engine] a jet engine icing condition where ice accumulates on the fan blades. See FAN BLADES, ENGINE ICING, GROUND-ACCUMULATED ICE, OPERATIONAL ICE.

fan blades, [aircraft engine] blades located at the front of the engine and part of the fan section. Fan blades draw in large amounts of air and provide the primary propulsion force in bypass engines. Fan blades are susceptible to icing. – See OPERATIONAL ICE, GROUND-ACCUMULATED ICE.

fan shape, [aircraft deicing] a wide low impact SPRAY PATTERN that fans out to cover uniformly large areas. – Compare SOLID STREAM, SEMI-FAN SHAPE.[171] [SAE ARP1971]

field, **1.** [experimental sciences] the natural, real-world environment where experiments are conducted, as opposed to a controlled laboratory setting; *a foaming test in the laboratory vs a foaming test on an aircraft in the field*. **2.** [psychology–system model of creativity] the social context or the community of experts, critics, and audience members who evaluate and recognize creative work within a domain. The field includes the social roles, norms, and institutions that influence how creative contributions are judged and accepted; *SAE G-12 is an organization acting as a field that influences how innovation is introduced in the domain of aircraft ground deicing*. **3.** [aviation] a short form for airfield. – Compare DOMAIN. See FIELD INSTRUMENT.[65,126] [Csikszentmihalyi, Lee]

field instrument, **1.** [chemistry] an instrument designed for non-laboratory setting, such as outdoors or an industrial environment, usually rugged, portable and simpler than a laboratory instrument; *digital and analog handheld refractometers are field instruments*. **2.** results from field instruments are generally less accurate or less precise than laboratory instruments. – Compare LABORATORY INSTRUMENT.

field test, [aircraft deicing] a test performed on-site at an airport, not with a laboratory instrument; *a foaming test spraying fluid on an aircraft*, *a refraction measurement with a handheld refractometer, a pH measured with a portable pH meter*.[178] [ARP6207]

fifth crosshair failure, **1.** [fluid testing] the moment when the fifth crosshair is obscured by contamination on a STANDARD TEST PLATE during endurance time tests. **2.** a criterion for visual fluid failure during a standard test plate endurance time test. – See CROSSHAIR, endurance time tests. Compare FOURTH CROSSHAIR FAILURE.[135] [Myers]

film breaks, [surface chemistry] the rupture or failure of thin liquid films due to instability, external forces, or surface tension effects. Film breaks can occur due to a) capillary forces: when the film becomes too thin, surface tension can cause it to rupture; b) impurities: contaminants can weaken the film structure, leading to breakage, c) hydrodynamic drainage: as liquid drains from the film, it may reach a critical thickness where rupture is inevitable, d) thermal fluctuations: variations in temperature can alter film stability, causing spontaneous rupture. **2.** [aircraft deicing fluids] an undesirable phenomenon where the deicing fluid film ruptures on the treated surface. for the above-mentioned reasons. – See FISHEYES, CRAWLING, WETTING FAILURE.[61] [Chatzigiannakis]

fin, [aircraft components] the fixed stabilizing surface forward part of the VERTICAL TAIL. – Synonym: VERTICAL STABILIZER.[85,198] [FAA H-8083-3C, Shevell]

finding, **1.** result of an audit presented as a conformity or NONCONFORMITY measured against audit criteria, or an opportunity for improvement; *a finding*. **2.** a factual account supported by evidence of how an organization is not in compliance with requirements. – See FINDINGS.[190,210] [SAE AS6332, TC AC SUR-002]

findings, the collective results of an audit; *the findings of an audit*. – See FINDING.[190] [SAE AS6332]

fire extinguishing agents, **1.** foam, dry chemicals, and solutions used to extinguish fires. **2.** [aircraft brakes] potential contaminants for carbon brakes.[160] [SAE AIR5490]

first icing event, **1.** [fluid testing] the initial ice crystal formation generally occurring at surface discontinuities, such as gaps, and at the edges of surfaces, where the fluid is at its thinnest. **2.** the location, generally, from which areas of ice crystal coverage grow. **3.** first icing event, sometimes called first failure, may or may not be a significant event in the progression to fluid failure. – See FLUID FAILURE.[135] [Myers]

first failure, see FIRST ICING EVENT.

fishbone diagram, **1.** a visual tool used in quality management to systematically identify and organize the many potential causes of a specific problem or effect. When drawn, the chart resembles the skeleton of a fish, with the problem placed at the "head" and the causal categories branching off like ribs along the "spine". **2.** presented by Kaoru Ishikawa at the Japanese Union of Scientists and Engineers in 1945 and documented in his 1954 book *Introduction to Quality Control*. – Synonyms: ISHIKAWA DIAGRAM, CAUSE-AND-EFFECT DIAGRAM. – Compare FIVE WHYS.[12] [ASQ Glossary]

fisheyes, **1.** [surface chemistry] small, circular, crater-like defects that appear in coatings or paints due to HYDROPHOBIC surface contamination with oil, wax, silicone, or grease. **2.** [aircraft deicing fluids] an undesirable phenomenon where small, circular, crater-like defects appear in the deicing fluid treated surface. Fisheyes generally occur due to surface hydrophobic contamination or poor WETTING properties of the deicing fluid caused by an ineffective surfactant or hydrophobic contamination within the fluid. – See CRAWLING, FILM BREAKS, WETTING FAILURE.[199] [Sherwin-Willams]

five whys, **1**. a problem-solving technique used to identify the root cause of an issue. It consists in identifying the problem, asking why to find the immediate cause and asking why four more times to identify the root cause. It is used in lean manufacturing, quality control, and continuous process improvement. **2.** a method based on the patient and careful observation habits of Sakichi Toyoda in 1888 and perfected by Taiichi Ohno at Toyota. – Compare FISHBONE DIAGRAM.[146] [Ohno]

flaps, **1.** [aircraft components] moveable hinged portion of the TRAILING EDGE of the wing, usually between the AILERONS and the FUSELAGE. They are extended (deployed) to control lift during takeoff and landing. **2.** [aircraft deicing] when flaps (and SLATS) are kept extended (deployed) after deicing/anti-icing during taxi, the STANDARD HOLDOVER TIME and STANDARD ALLOWANCE TIME

are reduced. **3.** flaps are susceptible to frozen contamination caused by SPLASH UP. – See ADJUSTED HOLDOVER TIME, ADJUSTED ALLOWANCE TIME, SLATS. [85,198] [FAA H-8083-3C, Shevell]

flash freezing, [aircraft deicing] phenomenon when supercooled water or supercooled diluted deicing fluid rapidly undergoes phase transition to the solid state. It usually propagates outward from a NUCLEATING SITE. This may occur when dew (liquid water) is supercooled due to RADIATIONAL COOLING and the freezing is triggered by a movement of the aircraft, or when a warm diluted deicing fluid is sprayed on a cold-soaked surface.

flash point, **1.** [chemistry] the lowest temperature at which a combustible product will produce enough vapor to ignite in air at a given pressure. Flash point is important for the safe storage and transportation of products. **2.** [aircraft deicing fluids and runway deicing products] flash point is a PASS-FAIL (minimum 100 °C) PHYSICAL PROPERTY measured on Type I/II/III/IV fluids and runway deicing products during qualification.[33,152,165,167,168,169,195] [Bell, Rennie, SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435, Schaschke]

flight time, the time that elapses from the moment an aircraft first moves under its own power for the purpose of flight until the moment it comes to rest at the next point of landing.[1,216] [14 CFR § 1.1, TC TP 14052]

flightcrew, pilot, flight engineer, or flight navigator assigned to duty in an aircraft during FLIGHT TIME.[1] [14 CFR § 1.1]

flightcrew trainer, [aircraft deicing] the person responsible for deicing/anti-icing training for flightcrews.[189] [SAE AS6286]

flightdeck, **1.** front part of an aircraft from which pilot and copilot control the aircraft, communicate with air traffic control and monitor the aircraft systems. **2.** flightdeck is also called the COCKPIT, particularly in smaller aircraft. – Flightdeck is a G-12 HARMONIZED TERM; cockpit is not.[197] [Harmonization]

flowoff, **1.** [aerodynamics] the shedding of deicing/anti-icing fluid from aircraft surfaces during the TAKEOFF GROUND ROLL, ROTATION, LIFTOFF, and INITIAL CLIMB. Speed and time to accelerate to ROTATION SPEED have an important effect on fluid flowoff. **2.** during flowoff the fluid sheds, forming waves that affect the BOUNDARY LAYER in a manner similar to solid roughness. **3.** before rotation much of the fluid sheds in what is described as the PRIMARY WAVE. **4.** at rotation or soon thereafter, a SECONDARY WAVE usually forms and flows back from near the LEADING EDGE. – See FLUID ELIMINATION, AERODYNAMIC ACCEPTANCE TEST, TRANSIENT AERODYNAMIC EFFECTS OF FLUIDS , FLOWOFF FAILURE.[45,117,158,179] [Broeren, Koivisto, Runyan, SAE ARP6852]

flowoff failure, **1.** [aerodynamics of deicing/anti-icing fluids] condition that occurs when an insufficient amount of aircraft deicing/anti-icing fluid, with or without contamination, comes off the lifting surfaces (e.g., wing, horizontal stabilizer) during the TAKEOFF RUN. **2.** the history and the development of criteria for flowoff failure (and acceptable transient aerodynamic effects of fluids) are described in SAE ARP6852. **3.** in the laboratory, flowoff is verified in the AERODYNAMIC ACCEPTANCE TEST by measuring the BOUNDARY LAYER DISPLACEMENT THICKNESS and FLUID ELIMINATION. **4**. for ALLOWANCE TIME testing, flowoff is observed with anti-icing fluids contaminated with ice pellets and ice pellets mixed with other contaminants at the NRC wind

tunnel in Ottawa. – See FLOWOFF, AERODYNAMIC DEGRADATION, AERODYNAMIC FAILURE. Compare TRANSIENT AERODYNAMIC EFFECTS OF FLUIDS.[157,179,183] [Ruggi 2021, SAE ARP6852, SAE AS5900]

fluid adhesion, [fluid failure] effective adhesion of a fluid layer to a surface (aircraft or standard plate) due to viscosity and SURFACE TENSION forces, often with a matrix of ice crystals in the fluid layer, impeding the fluid movement under shear.[135] [Myers]

fluid aerodynamic transient effects, see TRANSIENT AERODYNAMIC EFFECTS OF FLUIDS.

fluid application guidelines, **1.** collective name given to the three tables providing the steps and conditions to follow when applying aircraft deicing fluids. These tables are published by the FAA and Transport Canada in their respective annual *Holdover Time Guidelines*. There is a table for the application of Type I, one for Type II and IV, and one for Type III fluid. **2.** the fluid application guidelines of the FAA and Transport Canada differ when it comes to one-step application procedures. – See FLUID COMPATIBILITY, ONE-STEP ANTI-ICING ONLY, ONE-STEP DEICING ONLY, ONE-STEP DEICING/ANTI-ICING.[89,212] [FAA HOT, TC HOT]

fluid bleed-through, see BLEED-THROUGH.

fluid compatibility, **1.** [aircraft deicing fluids] expression to signify that a Type I fluid from one manufacturer does not unduly reduce the PROTECTION TIME or HOLDOVER TIME of a Type II/III/IV from another manufacturer when the Type I is applied in the first step of a two-step application. There is (yet) no published SAE agreed upon laboratory method of verifying this. **2**. historically, fluid compatibility started to be considered as a potential issue when users started to use Type I and Type II/II/IV fluids from different manufacturers in two-step applications. The regulators ask users to verify fluid compatibility by contacting the respective fluid manufacturers. **3.** laboratory tests have been proposed (and performed) by independent laboratories to evaluate fluid compatibility such as: a) verifying that the WATER SPRAY ENDURANCE TIME of the thickened fluid in the second step application still fulfils the specification requirement, or b) verifying for significant decrease in ENDURANCE TIME from a subset of tests to generate the HOLDOVER TIME GUIDELINES. – See FLUID APPLICATION GUIDELINES.[16,37,67,88] [Asnytska, Blackburn, D'Avirro, FAA General Info]

fluid elimination, **1.** one of the two results (outputs) of the aerodynamic acceptance test, the other being the lowest aerodynamic acceptance temperature. **2.** the extent to which a fluid is removed from the wind tunnel test section during the aerodynamic acceptance test. **3.** fluid elimination is determined by measuring the average residual thickness of fluid remaining on the lower plate of the test section after the aerodynamic acceptance test and measured within 5 minutes of the end of the test. **4.** a PASS-FAIL TEST for Type I where the final thickness shall not exceed 400 µm for the high speed ramp, 500 µm for the middle speed ramp, and 600 µm for the low speed ramp. **5.** a pass-fail test for Type II/III/IV where the final thickness shall not exceed 520 µm for the HIGH SPEED RAMP and MIDDLE SPEED RAMP, and 860 µm for the LOW SPEED RAMP. – See AERODYNAMIC ACCEPTANCE TEST, LOWEST AERODYNAMIC ACCEPTANCE TEMPERATURE.[183] [AS5900]

fluid failure, when an aircraft deicing fluid is no longer able to perform according to one or a combination of failure criteria such as VISUAL FAILURE, AERODYNAMIC FAILURE, ADHESION

FAILURE, FLOWOFF FAILURE, or WETTING FAILURE. – See FLUID FAILURE CRITERIA.[182,216] [SAE AS5681, TC TP 14052]

fluid erosion, FLUID FAILURE MECHANISM by which the fluid viscosity at the exposed surface is reduced by incoming precipitation and the fluid progressively bleeds off. Eventually, the entire film is eroded and the unprotected test surface, airfoil or aircraft surface freezes. – Compare FLUID SURFACE FREEZING. See VISUAL FAILURE, FLUID FAILURE CRITERIA. [TP 13129]

fluid failure criteria, the reasons or standards for considering a fluid failed after application on an aircraft, test AIRFOIL or STANDARD TEST PLATE, such as VISUAL FAILURE, AERODYNAMIC FAILURE, ADHESION FAILURE, FLOWOFF FAILURE, or WETTING FAILURE. – See AERODYNAMIC ACCEPTANCE TEST, FLOWOFF.[44,132] [Brittanica, MW]

fluid failure front, an advancing ice crystal layer front from thinner anti-icing fluid areas to thicker fluid areas as a result of uneven fluid application, gaps or recesses in the surface, or surface gradients; thinner fluid areas are diluted more rapidly by precipitation than thicker areas.[135] [Myers]

fluid failure mechanism, [aircraft deicing] the process by which a fluid fails. Examples of fluid visual failure mechanism are fluid erosion and fluid surface freezing.

fluid flowoff, see FLOWOFF.

fluid manufacturer, [aircraft deicing fluids] a manufacturer of aircraft deicing fluids. A fluid manufacturer should normally provide a) a product information bulletin that should describe the FLUID PROPERTIES, including PERFORMANCE PROPERTIES, OPERATIONAL PROPERTIES, PHYSICAL PROPERTIES, and ENVIRONMENTAL PROPERTIES, b) a SAFETY DATA SHEET, and c) a SALES SPECIFICATION. – Compare ORIGINAL MANUFACTURER. See LICENSEE, SUBCONTRACTOR.

fluid properties, [aircraft deicing fluids] the collective properties of a deicing/anti-icing fluid comprising PHYSICAL PROPERTIES, PERFORMANCE PROPERTIES, OPERATIONAL PROPERTIES, and ENVIRONMENTAL PROPERTIES.

fluid quality inspector, person performing the quality control of fluids.[189] [SAE AS6286]

fluid residue, an accumulation of dried-up thickened fluids in AERODYNAMICALLY QUIET AREAS of an aircraft that may rehydrate when exposed to rain or humidity to form a gel that may freeze and impede the free movement of control surfaces. – Compare RESIDUAL FLUID.[76,127,188] [EASA SIB 2008-29, Guide, SAE AS6285]

fluid-specific holdover time guideline, **1.** a holdover time guideline created and published for a specific Type II, III, or IV fluid, each with a unique name, that can only be used with that specific fluid and cannot be used with any other fluid. **2.** there are no Type I fluid-specific holdover times guidelines. – Compare GENERIC HOLDOVER TIME GUIDELINE.[176,178] [SAE ARP5718, SAE ARP6207]

fluid surface freezing, a FLUID FAILURE MECHANISM whereby the upper surface of the fluid absorbs some precipitation and begins to freeze. The lower layer of the fluid is not frozen but since

the surface is frozen, the fluid would be considered failed by a test observer or a pilot. The fluid has visually failed. There is no assurance that the contaminated upper surface layer would come off during the TAKEOFF GROUND ROLL. – Compare FLUID EROSION. See VISUAL FAILURE, FLUID FAILURE CRITERIA. (TP 13129E)

fluid transfer system, any deicing/anti-icing apparatus (e.g., pumps, valves, nozzles, pipes, hoses, dry disconnect couplings, deicing unit) through which Type I/IV/III/IV is transferred, regardless as to the reason for or outcome of such transfer. – See SHEAR DEGRADATION, SHEAR FORCE.[188] [SAE AS6285]

foam stability, [aircraft deicing fluids] a DETERMINE AND REPORT TEST to establish the tendency to foam and measure foam stability of Type I fluids at 60 °C, mixing it in a Waring blender, pouring it on a cold inclined flat plate and estimating percent foam coverage on the plate after 15 minutes.[165] [SAE AMS1424]

fog, **1.** [meteorology] a visible suspension of small water droplets (5–15 μm in diameter) near the surface of the earth, reducing visibility to less than 5/8 mile (1/2 mile in Canada). **2.** [meteorology] visibility reduction in fog depends on concentration of cloud condensation nuclei and the resulting distribution of droplet sizes. **3.** [meteorology] when composed of ice crystals, it is termed ice fog. **4.** [meteorology] fog seldom forms when the DEWPOINT spread is greater than 4 °F (2 °C). **5.** [meteorology] an OBSCURATION with METAR CODE FG at temperatures above freezing or when ice accretion is not observed. – Synonym: GROUND FOG. Compare ICE FOG.[11,74,112,142] [AMS Glossary, Dunlop, ICAO 9640, NOAA FMH-1]

folding wing, 1. a type of wing designed to fold in a specific manner to reduce the wingspan when not in flight; *the Boeing 777-8 incorporates folding wing in its design—extended its wingspan is 235 feet 5 inches and folded 212 feet 9 inches; special precautions need to be taken when deicing a folding wing to avoid washing away lubricants.*[42,188] [Boeing 777X, SAE AS6285]

follow-me vehicle, a specialized vehicle used at airports to guide aircraft during operations on the ground and normally equipped with identifiable lights, signage, and/or markings to make it easily recognizable.[101,200] [GTAA 2024, Skybrary]

forced air, a method of deicing using a flow of air under pressure to remove frozen contamination from an aircraft; it may be used in conjunction with deicing or anti-icing fluids. – See SHEAR FORCE.[163,188] [SAE AIR6284, SAE AS6285]

form, **1.** [chemistry] physical form describes the state of matter (solid, liquid, gas, or plasma) or the crystalline structure of a substance. **2.** [chemistry] chemical form describes the molecular or structural arrangement of atoms in a compound; for example, PROPYLENE GLYCOL comes in three forms, the *dl*-form (racemic mixture), the *d*-form (dextrorotatory enantiomer) and the *l*-form (levorotatory enantiomer). **3.** [aircraft deicing fluids] it is a requirement of AMS1424 and AMS1428 that aircraft deicing fluids (Type I/II/III/IV) be in the form of a liquid. **3. [**runway deicing products] it is a requirement that runway deicing products fulfilling the requirements of AMS1431 be in the form of a solid and those fulfilling the requirements of AMS1435 be in the form of a liquid.[144,165,167,168,169] [Merck Index, SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435]

foreword, [SAE documentation] an unnumbered section after the RATIONALE and before the table of contents in SAE standards. It includes pertinent information that is not part of the technical text, relationship of the SAE standard to other SAE standards, history and background.[193] [SAE Style Manual]

foundation specification, **1.** a specification that establishes the requirements for all Type I or Type II/III/IV deicing/anti-icing fluids, defines glycol (conventional and non-conventional) based and non-glycol based fluids, and contains additional properties and requirements that apply to both glycol (conventional and non-conventional) and non-glycol based products. **2.** SAE AMS1424 and SAE AMS1428 are the only foundation specifications. **3.** SAE AMS1424/1, SAE AMS1424/2, SAE AMS1428/1 and SAE AMS1428/2 are not foundation specifications. – Compare CATEGORY SPECIFICATION. See GLYCOL (CONVENTIONAL), GLYCOL (NON-CONVENTIONAL), NON-GLYCOL.[165,167] [SAE AMS1424, SAE AMS1428]

fourth crosshair failure, **1.** [fluid testing] the moment when the fourth CROSSHAIR is obscured by CONTAMINATION on a STANDARD TEST PLATE during endurance time tests. **2.** not a criterion for visual fluid failure during a standard test plate endurance time test. – Compare FIFTH CROSSHAIR FAILURE.[135] [Myers]

frac tank, a large portable steel tank for storing bulk liquids that can normally be moved when empty.

freezing drizzle, **1.** [meteorology] uniform liquid precipitation composed of fine water droplets less than 0.5 mm in diameter but greater than 100 µm that freeze on impact with the ground or other exposed objects that are below 0 °C. **2.** [meteorology] freezing drizzle intensities are defined as light (-FZDZ) (the rate of fall from a trace to 0.3 mm (0.01 in.) h^{-1}), moderate (FZDZ) (the rate of fall from 0.3–0.5 mm (0.01–0.02 in.) h^{-1}), and heavy (+FZDZ) (the rate of fall greater than 0.5 mm (0.02 in.) h^{-1}). **3.** [endurance time testing] condition with a PRECIPITATION RATE of 5–13 $g/dm^2/h$. **4.** [aircraft deicing] a precipitation condition with a holdover time. The freezing drizzle intensities in the freezing drizzle holdover time condition include light, moderate and heavy freezing drizzle. – See DRIZZLE.[34,74,89,112,142,173,188,189,203,212] [Bendickson, Dunlop, FAA HOT, ICAO 9640, NOAA FMH-1, SAE ARP5485, SAE AS6285, SAE AS6286, SIAGDP, TC HOT]

freezing fog, **1.** [meteorology] a fog formed of supercooled small water droplets which reduce visibility to less than 5/8 mile (1/2 mile in Canada) at the earth's surface and freeze upon contact with exposed objects below 0 °C and can form a coating of rime and/or glaze ice. **2.** [meteorology] a freezing OBSCURATION with METAR CODE FZFG. **3.** [endurance time testing] condition with PRECIPITATION RATE of 2–5 $g/dm^2/h$. **4.** [aircraft deicing] a condition with a holdover time. – See FOG, GLAZE, RIME.[34,74,112,142,173,188,203] [Bendickson, Dunlop, ICAO 9640, NOAA FMH-1, SAE ARP5485, SAE AS6285, SIAGDP]

freezing level, **1.** [meteorology] the lowest altitude in the atmosphere, over a given location, in the atmosphere at which air temperature is at 0 °C. **2**. the height of 0 °C constant temperature surface.[11,74] [AMS Glossary, Dunlop]

freezing mist, **1.** mist occurring at temperatures below freezing, resulting in ice buildup on objects. **2**. a condition not reported by METAR and best confirmed by visual observation. **3.** [aircraft

deicing] a precipitation condition that has the same holdover time as FREEZING FOG and ICE CRYSTALS. – See MIST.[89,212] [FAA HOT, TC HOT]

freezing nucleus, [meteorology] any particle that will induce the crystallization of supercooled water. – Compare CONDENSATION NUCLEUS, DEPOSITION NUCLEUS. See NUCLEATION, NUCLEUS, ICE NUCLEUS.[11,44,74] [AMS Glossary, Britannica, Dunlop]

freezing point (fp), **1.** the temperature at which a liquid starts to become a solid as the temperature is lowered very slowly (at a given pressure, in the presence of a nucleation site). **2.** [aircraft deicing] the freezing point of a deicing fluid as determined by direct measurement of freezing point or, most often, indirectly through a measurement of refraction. **3.** freezing point is a PERFORMANCE PROPERTY of an aircraft deicing fluid and is needed to calculate its the LOWEST OPERATIONAL USE TEMPERATURE. **4.** freezing point is a PASS-FAIL TEST for aircraft deicing fluids and runway deicing products determined using ASTM D1177. – See FREEZING POINT CURVE, REFRACTION, SURROGATE. Compare POUR POINT.[18,127,165,167,168,216] [ASTM D1177, Guide, SAE AMS1424, SAE AMS1428, SAE 1431, SAE AMS1435, TC TP 14052]

freezing point buffer, the difference between the FREEZING POINT of the fluid and the OUTSIDE AIR TEMPERATURE.[88,162,188,203,216] [FAA General Info, SAE AIR6232, SAE AS6285, SIAGDP, TC TP 14052]

freezing point curve, 1. [physical chemistry] the relationship between temperature and the PHASE TRANSITION of a substance as it freezes. **2.** [physical chemistry, freezing point depression] the relationship between temperature and the FREEZING POINT of a solution as a function of the concentration of a SOLUTE in a SOLVENT. **3.** [aircraft deicing fluids] MANDATORY INFORMATION of the freezing point relationship expressed as volume dilution, reported increments of 10% (or more) of the Type I deicing fluid concentrate with water. The relationship may be expressed in the form of an equation, a table or graph. – See FREEZING POINT DEPRESSION, REFRACTION, TYPE I CONCENTRATE.

freezing point depressant, **1.** [chemistry] a SOLUTE to be dissolved a SOLVENT, to reduce the freezing point of the resulting SOLUTION. **2.** [aircraft ground deicing] a component, usually a glycol, used the formulation of deicing or anti-icing fluids to lower the freezing point of water. **3.** [in-flight ice protection] a component used in the formulation of fluids for in-flight FREEZING POINT DEPRESSANT ICE PROTECTION SYSTEMs. – See FREEZING POINT DEPRESSION, GLYCOL.

freezing point depressant ice protection system, **1.** an IN-FLIGHT ANTI-ICING ICE PROTECTION SYSTEM which introduces a FREEZING POINT DEPRESSANT— usually mixtures of water with ISOPROPANOL, METHANOL, ETHANOL, or ETHYLENE GLYCOL—to impinging water droplets, lowering the freezing point of the impinging water below the airflow temperature and/or reducing the friction coefficient of those surfaces, preventing the ice from adhering to the surface. The resulting impinging water/freezing point depressant mixture evaporates or is shed from the aircraft surface by aerodynamic forces or centrifugal force (for propellers). *Examples of commercial freezing point depressant mixtures for weeping wing systems: AeroShell Compound 07, Clariant Safewing TKS 406B, Cryotech TKS 406B, Kilfrost TKS 80, PRIST TKS, TKS Fluid; such products must never be used as ground aircraft deicing/anti-icing fluids.* **2.** freezing point ice protection systems are mostly used on smaller general aviation aircraft; *for example, the Cessna 208 Caravan,*

Kodiac 900, Kodiac 100, Diamond DA 42, Mooney M20, Technam P2012. **3.** the freezing point depressant ice protection systems were developed for the Royal Air Force bombers during WWII. **4.** in-flight ice protection systems are not designed to perform ground deicing/anti-icing. **5.** deicing boot ice adhesion inhibitors are not freezing point depressant mixtures and cannot be used in freezing point depressant ice protection systems. – Colloquial or commercial synonyms: WEEPING WING, TKS ICE PROTECTION SYSTEM. Compare EVAPORATIVE ICE PROTECTION SYSTEM. See ICE PROTECTION SYSTEM, DEICING BOOT.[59,80,174] [CAV, FAA AC 91-74B, SAE ARP5624]

freezing point depression, the lowering of the freezing point of a substance by adding another soluble substance to it. – See COLLIGATIVE PROPERTY.[127,152] [Guide, Rennie]

freezing rain, **1.** [meteorology] rain falling as liquid, typically supercooled, that freezes upon impact on objects that are below 0 °C, forming a layer of clear ice.

> *light freezing rain* (-FZRA)**, 2.** [meteorology] (qualitative intensity), scattered drops that do not completely cover a surface **3.** [meteorology] (quantitative intensity) freezing rain with an intensity of 2.5 mm/h or less. **4.** [endurance time testing] a precipitation with a rate of 13–25 g/dm^2/h. **5.** [aircraft deicing] a precipitation condition with a holdover time.
>
> *moderate freezing rain* (FZRA), **6.** [meteorology] (quantitative intensity) freezing rain with a precipitation rate of 2.5–7.6 mm/h (25–76 g/dm^2/h) **7**. [aircraft deicing] a precipitation condition without a holdover time.
>
> *heavy freezing rain* (+FZRA), **8.** [meteorology] (estimated intensity) freezing rain that seems to fall in sheets and where individual droplets may not be identifiable. **9.** [meteorology] (quantitative intensity) freezing rain with a precipitation rate > 7.6 mm/h (> 76 g/dm^2/h). **10.** [aircraft deicing] a precipitation condition without a holdover time.
>
> See RAIN ON COLD-SOAKED WING, PRECIPITATION RATE.[34,56,142,173,188,189,203,216] [Bendickson, MANOBS, NOAA FMH-1, SAE ARP5485, SAE AS6285, SAE AS6286, SIAGDP, TP 14052]

friction and wear modifiers, [aircraft brakes] fluids that can affect the coefficient of friction of aircraft brakes, aggravate the effect of absorbed water, or affect the friction interface in such a way as to impact brake vibration, brake torque performance, and/or brake wear characteristics.[160] [SAE AIR5490]

front, [meteorology] the boundary, interface, or transition zone between two air masses of different density (thus of different humidity or temperature).[11,74] [AMS Glossary, Dunlop]

frontal fog, [meteorology] fog associated with frontal passages. Fog forms by either a) rain falling into cold air raising the DEWPOINT temperature, or b) the mixing of warm and cold air cooling the air over moist ground.[11,74] [AMS Glossary, Dunlop]

frost, **1.** [meteorology] white ice crystals formed by water vapor changing directly into ice without going through the liquid phase in a process called deposition (sometimes called desublimation) in the presence of nucleating sites on objects with temperatures at or below the frost point. **2.** [aircraft deicing] white ice crystal formed by the freezing of dew or the deposition of water vapor directly

into ice. **3.** [runway contaminant], ice crystals formed from airborne moisture that forms on a surface whose temperature is below freezing. Frost differs from ice in that the frost crystals grow independently and therefore have a more granular texture. – Synonyms: HOARFROST, WHITE FROST. – See ACTIVE FROST, DEW, FROZEN DEW, FROST POINT, DEWPOINT, FROST FORMATION CHART, NUCLEUS, FREEZING NUCLEUS, THIN HOARFROST, DEPOSITION, DESUBLIMATION, COLD SOAKED FUEL FROST.[84,112,188,219] [FAA AC150/5300-14D, ICAO 9640, SAE AS6285, TSB]

frost formation chart¸ **1.** a graph used to determine the minimum RELATIVE HUMIDITY at varying OUTSIDE AIR TEMPERATUREs (OATs) required to form frost on a surface below OAT and below 0 °C, as frost does not form if surface temperature is above 0 °C. Frost can form at OAT above 0 °C if a) the surface temperature is below freezing and b) the air right next to the surface is saturated. **2.** frost formation charts are useful in fields like aviation, HVAC, meteorology, and cryogenics, where understanding surface icing conditions is critical. **3.** a frost formation chart (along with much experimental data) was used to recommend test parameters needed for the simulation of active frost conditions to conduct endurance time tests in a laboratory setting. – See RADIATIONAL COOLING, EMISSIVITY, SATURATION MIXING RATIO OVER ICE, SATURATION MIXING RATIO OVER WATER.[68] [Dawson 2003]

frost point, the temperature at which unsaturated air must be cooled, at constant barometric pressure and constant water vapor content, to reach SATURATION with respect to ice. The frost point is generally above (warmer than) the dewpoint. – Compare DEWPOINT. See SATURATION MIXING RATIO OVER ICE. [74,88,188,189,216,219] [Dunlop, FAA General Information, SAE AS6285, SAE AS6286, TC TP 14052, TSB]

frosticator test plate, **1.** [aircraft deicing fluid testing] a plate used for endurance time testing under frost conditions. **2.** it consists of a standard aluminum or composite test plate fitted underneath with a 5 cm thick R10 insulation panel bonded with silicone epoxy. The frosticator plate is coated with white aircraft-grade paint. – Compare STANDARD TEST PLATE, STANDARD ALUMINUM PLATE, STANDARD COMPOSITE PLATE.[177] [ARP5945]

frozen contamination, any forms of frozen or semi-frozen deposits on an aircraft, such as FROST, SNOW, SLUSH, ICE, ICE PELLETS or HAIL within a fluid, frozen fluid or semi-frozen fluids (collectively referred to as frozen contamination or simply contamination) – See CONTAMINATION. Compare CHEMICAL CONTAMINATION.

frozen dew, **1.** [meteorology] ice formed by the freezing of dew on objects near the ground. **2.** [aircraft deicing] in the field of aircraft ground deicing, frozen dew is considered a form of frost. On aircraft surfaces, dew can become supercooled and is subject to sudden freezing induced by movement of the aircraft. – See DEW, FROST.[8,107] [Ahrens, Horrigan 2011]

fuel frost, see COLD-SOAKED FUEL FROST. – Synonym: NONENVIRONMENTAL FROST.[188] [SAE AS6285]

fuel temperature, **1.** [aircraft parameter] temperature of the aircraft fuel. **2.** some aircraft have temperature gauges allowing the pilot to monitor fuel temperature in-flight. **3.** the fuel in the aircraft can become cold due to a) the fuel having already been at low temperature during refueling,

b) the aircraft sitting on the ground in cold temperatures, or c) because of prolonged flying in cold conditions, typically at high altitudes. **4.** cold fuel temperatures may cause COLD SOAKING.

full plate failure, a fluid testing scenario in which 100 percent of the plate has reached a VISUAL FAILURE condition. – Synonyms: COMPLETE PLATE FAILURE, ENTIRE PLATE FAILURE, TOTAL PLATE FAILURE.[135] [Myers]

function test, see FUNCTIONALITY CHECK.

functionality check, summary verification in the field that the instrument is functioning correctly. *For example, verify that the refraction of water measured on a refractometer reads zero Brix*. – Synonym: OPERATIONAL CHECK. Compare CALIBRATION.[188] [SAE AS6285]

fuselage, [aircraft components] body of the aircraft carrying crew and payload, passengers or cargo.[85,198] [FAA H-8083-3C, Shevell]

gas filled temperature gauge, a gauge in which gas expands as temperature increases, thereby creating a mechanical motion which is then read on an analog temperature numbered scale or digital readout. – See TEMPERATURE GAUGE.

generic, **1**. related to a whole group. **2.** not having a brand name. **3.** [aircraft deicing] said of the most conservative data derived from all the fluid-specific (branded) Type II or Type IV fluids; *the generic Type IV holdover time guideline*. – See GENERIC HOLDOVER TIME, GENERIC HOLDOVER TIME GUIDELINE.[132] [MW]

generic holdover time, **1.** the shortest holdover time range for all fluid-specific Type II fluids or Type IV fluids within a specified temperature range and for a specific precipitation type and intensity. **2.** Type II generic holdover time ranges are used to build the Type II generic holdover time guideline and Type IV generic holdover time ranges are used to build the Type IV generic holdover time guideline. – See GENERIC, GENERIC HOLDOVER TIME GUIDELINE.[209] [TC AC 700-061]

generic holdover time guideline, **1.** a holdover time guideline derived from the shortest holdover time ranges for all fluid-specific Type II fluids or all Type IV fluids. **2.** the Type II generic holdover time guidelines or the Type IV holdover time guideline. **3.** a holdover time guideline that can be used either with any brand name Type II or any brand name Type IV (but not both). – Compare FLUID-SPECIFIC HOLDOVER TIME GUIDELINE. See GENERIC, GENERIC HOLDOVER TIME.[176,178] [SAE ARP5718, SAE ARP6207]

glass electrode, [chemistry] an electrode made of a glass tube (and other components) whose bottom bulb is thin enough for hydrogen ions to diffuse through. When this bulb is placed in a solution containing hydrogen ions, the glass electrode generates an electrical potential that depends on the concentration of the hydrogen ions. The glass electrode is a component of a pH meter where the electrical potential of the glass electrode is measured and expressed as a measure of pH. – See pH.[123,152] [Law, Rennie].

glaze, **1.** [meteorology] a transparent layer of ice formed by supercooled drizzle, fog, rain, or cloud droplets on objects below 0 °C. **2.** [aircraft deicing] a term rarely used in ground deicing (in the

field of aircraft deicing the preferred term is clear ice). – Synonyms: GLAZE ICE, CLEAR ICE (when on the aircraft). See SUPERCOOLED WATER.[74] [Dunlop].

glaze ice, see GLAZE, CLEAR ICE.

global aircraft deicing standards, **1.** the three related SAE standards covering the processes of aircraft deicing (AS6285), how to train for those processes (AS6286), and the quality control of the processes (AS6332). **2.** the three global aircraft deicing standards, AS6285, AS6286, and AS6332, should be read in conjunction with each other.[188] [SAE AS6285]

global reporting format (GRF), an internationally accepted concept which utilizes visual inspection to report runway surface conditions.[207] [TC AC 300-019]

glycerine, see GLYCEROL

glycerol, **1.** [chemistry] Chemical Abstract registry number 56-81-5, alternate name: 1,2,3-propanetriol, trihydroxypropane, glycerin, glycerine; molecular formula $C_3H_8O_3$; mol wt 92.09; bp 290 °C. **2.** [runway deicing products] a FREEZING POINT DEPRESSANT used in runway deicing products usually in combination with salts (formates or acetates). – Compare SODIUM FORMATE, SODIUM ACETATE, POTASSIUM FORMATE, POTASSIUM ACETATE.[144] [Merck Index].

glycol, **1.** [chemistry] class of organic compounds with two hydroxyl groups (–OH) attached to different carbons; *ethylene glycol, propylene glycol, diethylene glycol, polyethylene glycol, polypropylene glycol*. **2.** [chemistry] term often applied to the simplest member of the class, ethylene glycol. **3.** [aircraft deicing] usually refers to ETHYLENE GLYCOL or PROPYLENE GLYCOL. **4.** [aircraft deicing] imprecise colloquial term for aircraft deicing/anti-icing fluids. – See FREEZING POINT DEPRESSANT. Compare NEW GLYCOL, RECYCLED GLYCOL.[44,152,195] [Brittanica, Rennie, Schaschke]

glycol (conventional), [aircraft deicing fluids] ethylene glycol, diethylene glycol, or propylene glycol. – Compare NON-GLYCOL, GLYCOL (NON-CONVENTIONAL). See ETHYLENE GLYCOL, DIETHYLENE GLYCOL, PROPYLENE GLYCOL.[165,167] [SAE AMS1424, SAE AMS1428]

glycol (non-conventional), [aircraft deicing fluids] organic non-ionic diols and triols, e.g., 1,3-PROPANEDIOL, GLYCERINE, and mixtures thereof, and mixtures with glycol (conventional). Compare GLYCOL (CONVENTIONAL), NON-GLYCOL.[165,167] [SAE AMS1424, SAE AMS1428].

glycol mitigation plan, a plan to capture and dispose of spent deicing/anti-icing fluids in an environmentally conscientious manner in accordance with the applicable regulations, standards and guidelines. – See SPENT DEICING FLUID.[101] [GTAA 2024]

glycol recovery vehicle (GRV), a specialized vehicle designed to pick up SPENT DEICING FLUID from the ground, e.g., on ramps, at gates, deicing pads, or at central deicing facilities.

ground-accumulated ice, [aircraft engine icing] ice accumulated on the fan blades while the aircraft has been on the ground for a prolonged stop, such as an aircraft that has been parked overnight. Ground-accumulated ice in the engine must be removed before engine start. – Compare OPERATIONAL ICE. See ENGINE ICING, FAN BLADE ICING.[38] [Boeing 737-600 AMM]

ground coordinator, person responsible for coordination of ground deicing operations within a deicing facility.[175] [SAE ARP5660]

ground deicing and anti-icing program, see GROUND DEICING PROGRAM (the HARMONIZED TERM is ground deicing program).

ground deicing program, **1.** a set of procedures, guidelines, processes, and training, all documented, to ensure that aircraft depart safely, according to regulations. **2.** airline or service provider documentation on ground deicing as required by the regulator. – Synonyms: GROUND ICING PROGRAM, GROUND DEICING AND ANTI-ICING PROGRAM.[82,88,190,214,216] [FAA AC 120-60B, FAA General Info, SAE AS6332, TC 622.11, TC TP 14052]

ground fog, see FOG.

ground ice detection system (GIDS), an ice detection system used during aircraft ground deicing operations designed to detect frozen contamination on an aircraft.[75,76, 209] [EASA EU Reg, EASA SIB 2008-29, TC AC 700-061]

ground icing, **1.** [meteorology] the accumulation of frost, ice, snow, or any freezing or frozen precipitation on the ground or on objects near the ground. **2.** [aircraft deicing] icing that occurs on the aircraft, propellers and engines (including rotors for rotorcraft) while the aircraft is on the ground. – See GROUND ICING CONDITIONS. Compare IN-FLIGHT ICING.

ground icing conditions, **1.** [aircraft deicing] conditions conducive to the presence of frozen contamination on an aircraft, propellers, rotors, instruments, or engines while on the ground including ice acquired in flight, freezing or frozen precipitation on the ground, frost, cold soaking, etc. **2.** conditions requiring the initiation of ground deicing operations. **3.** [aircraft and engine icing] ground icing conditions generally exist when the OUTSIDE AIR TEMPERATURE is 10 °C or below, and/or operating on ramps, taxiways, or runways where surface snow, ice, standing water, or slush, are present and may be ingested by engines. – Compare IN-FLIGHT ICING CONDITIONS. See GROUND ICING, AIRCRAFT ICING CONDITIONS.[190,202,214,216] [SAE AS6332, SW FOM, TC 622.11, TC TP 14052,]

ground icing program, see GROUND DEICING PROGRAM (the HARMONIZED TERM is ground deicing program; the Transport Canada designation is ground icing program).

ground roll, see TAKEOFF GROUND ROLL.

groundcrew, personnel with responsibilities for the handling, maintenance and servicing of an aircraft while on the ground, as well as the coordination of these activities.[188] [SAE AS6285]

guard leg, [viscometry] a U-shaped band of metal that attaches to the viscometer and protects the SPINDLE and sensing shaft from accidental bumps and providing an outer boundary condition for the shearing action imparted to the fluid by the rotating spindle.[133] [McGregor]

guidance, **1.** advice or information aimed at resolving a problem or difficulty. **2.** [aircraft deicing] documentation from REGULATORs, aircraft manufacturers, FLUID MANUFACTURERs, and other organizations, such as SAE and ICAO, to ensure safe departure in aircraft ground icing conditions.

gyroplane, a ROTORCRAFT whose rotors are not engine-driven, except for initial starting, but are made to rotate by action of the air when the rotorcraft is moving; and whose means of propulsion, consisting usually of conventional propellers, is independent of the rotor system.[1] [14 CFR § 1.1]

hail, **1.** [meteorology] solid precipitation in the form of transparent or opaque small balls or irregular pieces of ice with a diameter of 5 mm or greater, falling from a convective cloud separately or frozen together. **2.** hail encompasses small hail, but the opposite is not true. **3**. the METAR CODE for hail in the United States is GR with remark ¼ or greater, in the rest of the world GR. **4.** [aircraft deicing] a precipitation for which there is no HOLDOVER TIME and no ALLOWANCE TIME except in the case of SMALL HAIL. **5.** [aviation] a type of precipitation that can cause impact damage to aircraft.[74,112,142,188,189,203,216,227] [Dunlop, ICAO 9640, NOAA FMH-1, SAE AS6285, SAE AS6286, SIAGDP, TC TP 14052, WestJet YYC]

hailstone, [meteorology] a single unit of hail, ranging in size from that of a pea to, on rare occasions, exceeding that of a grapefruit (i.e., from 5 mm to more than 15 cm in diameter).[11] [AMS Glossary]

hangaring, [rotorcraft deicing] sheltering a ROTORCRAFT, such as a HELICOPTER, in a hangar to protect it against freezing or frozen precipitation.

hard water, **1.** water containing high concentration of naturally occurring salts, usually calcium or magnesium salts. **2.** [aircraft deicing fluids] divalent ions (e.g., calcium ions, magnesium ions) in hard water can interfere with the thickeners of Type II/III/IV fluids, thus reducing their viscosity. **3.** water with a high concentration of salts as defined in AMS1424 or AMS1428.[165,167] [SAE AMS1424, SAE AMS1428]

hard water stability, **1.** [unthickened aircraft deicing fluids] an ACCELERATED AGING Type I PASS-FAIL TEST that verifies the effect of HARD WATER (upon storage at high temperature for 30 days in a sealed container) on pH and the WATER SPRAY ENDURANCE TIME. **2.** [thickened aircraft deicing fluids] an accelerated aging test Type II/III/IV PASS-FAIL TEST (not normally performed on fluids intended for use only undiluted) that verifies the effect of hard water (upon storage at high temperature for 30 days in a sealed container) looking for separation, precipitation or insoluble deposits, and measuring pH and the water spray endurance time.[165,167] [SAE AMS1424, SAE AMS1428]

hard wing, **1.** a wing without a moveable LEADING EDGE device or SLAT. **2.** a wing with a fixed geometry leading edge.[82,88] [FAA General Info, FAA AC 120-60B]

harmonized term, [aircraft deicing] a word or combination of words representing a concept whose spelling is recommended by the SAE G-12 Steering Committee for use within the SAE G-12 documents and standards.[197] [Harmonization]

head of deicing training, the person responsible for ensuring effective delivery of deicing/anti-icing training to personnel for the whole organization and whose competence is documented. The head of deicing training may cumulate the positions of PROGRAM MANAGER, RESPONSIBLE PERSON or ACCOUNTABLE EXECUTIVE.[189] [SAE AS6286]

heavy, see INTENSITY QUALIFIER.

heavy drizzle, see DRIZZLE.

heavy freezing drizzle, see FREEZING DRIZZLE.

heavy freezing rain, see FREEZING RAIN**.**

heavy rain, see RAIN.

heavy snow, see SNOW.

helicopter, **1.** a rotorcraft that, for its horizontal motion, depends principally on its engine-driven rotors. **2.** a type of rotorcraft that uses powered rotors to achieve both lift and propulsion. Helicopters can hover, take off, and land vertically. – Compare ROTORCRAFT, POWERED-LIFT.[1] [14 CFR § 1.1]

helo, a colloquial word for HELICOPTER.

high concentration spent deicing fluid, fluid with glycol concentration suitable for recycling or anaerobic digestion.[172] [SAE ARP4902]

high humidity, an atmospheric condition where the RELATIVE HUMIDITY is close to SATURATION.[112] [ICAO 9640]

high humidity endurance test (HHET), **1.** a laboratory test (intended to simulate frost conditions) that measures endurance time of anti-icing fluid under conditions of high humidity. **2.** a laboratory test defined in SAE AS5901. **3.** a PASS-FAIL TEST under AMS1424 and AMS1428. **4.** a test used to classify Type I/II/III/IV fluids. **5.** one of the two tests that are used to evaluate fluids under the categorization anti-icing performance. – The acronym HHET is used for both high humidity endurance test and high humidity endurance time. See ANTI-ICING PERFORMANCE.[122,165,167,176,178,184,216] [Laforte 1992, SAE AMS1424, SAE AMS1428, SAE ARP5718, SAE ARP6207, SAE AS5901, TC TP 14052]

high humidity endurance time (HHET), the result of the high humidity endurance test. – The acronym HHET is used for both high humidity endurance test and high humidity endurance time. See HIGH HUMIDITY ENDURANCE TEST, FLUID PROPERTIES.

high humidity on cold soaked wing, see RAIN ON COLD-SOAKED WING (the HARMONIZED TERM is rain on cold soaked wing).

high speed aircraft, 1. colloquial term for LARGE JET TRANSPORT AIRCRAFT as described in the AERODYNAMIC ACCEPTANCE TEST standard (SAE AS5900). **2.** an aircraft category defined by each aircraft manufacturer based on specific aircraft performance. – Compare MIDDLE SPEED AIRCRAFT, LOW SPEED AIRCRAFT. See HIGH SPEED RAMP TEST.[183] [SAE AS5900]

high speed ramp (HSR), see HIGH SPEED RAMP TEST.

high speed ramp test, **1.** an AERODYNAMIC ACCEPTANCE TEST performed to simulate LARGE JET TRANSPORT AIRCRAFT takeoffs, with rotation speeds exceeding 100 knots and a time from brake

release to ROTATION SPEED greater than 20 seconds. **2.** a test conducted at 65 m/s (126 knots), representing a nominal speed at which an aircraft may safely become airborne with one engine inoperative (V_2), after a 25 second acceleration at 2.6 m/s². **3.** a test defined in AS5900. – See LOW SPEED RAMP TEST, MIDDLE SPEED RAMP TEST.[183] [SAE AS5900]

high viscosity initial qualification sample, **1.** [thickened fluids] upon initial qualification of Type II/III/IV fluids according to AMS1428, two samples have to be submitted to the testing laboratory performing the anti-icing performance test and the aerodynamic acceptance test (and other tests). The sample with the higher 0.3 rpm viscosity is designated the high viscosity initial qualification sample while the other is called the low viscosity initial qualification sample. The high viscosity initial qualification sample was formerly known as the HIGH VISCOSITY PREPRODUCTION SAMPLE or simply the HIGH VISCOSITY SAMPLE. **2.** the high viscosity initial qualification sample is normally laboratory produced in a quantity sufficient perform the initial qualification tests. **3.** the 0.3 rpm viscosity of the high viscosity initial qualification sample becomes the highest on-wing viscosity for that fluid. It is the highest viscosity that a fluid manufacturer can select for its sales specification. – Compare LOW VISCOSITY INITIAL QUALIFICATION SAMPLE.[176,167] [SAE AMS1428, SAE ARP5718]

high viscosity preproduction sample, former name of the HIGH VISCOSITY INITIAL QUALIFICATION SAMPLE.[176,167] [SAE AMS1428, SAE ARP5718]

high viscosity sample, **1.** [thickened fluids] a sample whose viscosity is high. **2.** short for the HIGH VISCOSITY INITIAL QUALIFICATION SAMPLE.[167] [SAE AMS1428]

highest on-wing viscosity, **1.** the viscosity result as measured on the high viscosity sample, as defined in SAE AMS1428 during the initial Type II/III/IV qualification, subjected to several requirements including the AERODYNAMIC ACCEPTANCE TEST(s). **2.** viscosity result to which viscosity of samples from the field are compared to as an imperfect SURROGATE for aerodynamic acceptance testing of Type II/III/IV fluids. **3.** the upper limit of viscosity that must not be exceeded for sales specifications of Type II/III/IV fluids. – Compare LOWEST ON-WING VISCOSITY. See SALES SPECIFICATION, VISCOSITY.[89,127,176,188,212] [FAA HOT, Guide, SAE ARP5718, SAE AS6285, TC HOT]

highest operational use concentration (HOUC) **of a Type I**, see TYPE I HIGHEST OPERATIONAL USE CONCENTRATION.

highest operational use refraction (HOUR) **of a Type I**, see TYPE I HIGHEST OPERATION USE REFRACTION.

highest usable precipitation rate (HUPR), the highest PRECIPITATION RATE at which an endurance time data set can be used to determine holdover times.[176] [SAE ARP5718]

hindsight bias, **1.** [safety science, psychology] the tendency of an after-the-fact reviewer of an event to exaggerate his own ability to predict and prevent the outcome while not being aware of that bias. **2.** the tendency, after an event has occurred, to overestimate the extent to which the outcome could have been foreseen. Hindsight bias stems from (a) cognitive inputs—people selectively recall information consistent with what they now know to be true; (b) metacognitive inputs—people may misattribute their ease of understanding an outcome to its assumed prior

likelihood; and (c) motivational inputs—people have a need to see the world as orderly and predictable. – See PLAN CONTINUATION BIAS.[13,72] [APA, Dekker 2014]

hoarfrost, **1.** [meteorology] a synonym for frost. **2.** [meteorology] a deposit of interlocking ice crystals (hoar crystals) formed by direct deposition on objects, usually those of small diameter freely exposed to the air, such as tree branches, plant stems and leaf edges, wires, poles, etc. **3.** [aircraft deicing] hoarfrost may form on the skin of an aircraft when a cold aircraft flies into air that is warm and moist or when it passes through air that is supersaturated with water vapor. The deposition of hoarfrost is similar to the process by which dew is formed, except that the frosted object must be below freezing. **4.** [aircraft deicing] term rarely used to describe white crystalline ice on an aircraft thin enough for surface features underneath, such as paint lines, markings, and lettering, particularly on the fuselage; more often it is called thin hoarfrost. – See THIN HOARFROST, FROST, DEWPOINT, FROST POINT, DEPOSITION, DEW, ICE CRYSTALS.[11,74,88,112,188,189,203,216] [AMS Glossary, Dunlop, FAA General Information, ICAO 9640, SAE AS6285, SAE AS6286, SIAGDP, TC TP 14052]

holdover time (HOT), **1.** the estimated time between the initial application to an aircraft of an anti-icing fluid subjected to precipitation until its visual failure at a predefined level of frozen contamination on the treated aircraft surfaces. **2.** time ranges of estimated protection against precipitation as published in holdover time tables for specified precipitation conditions and ranges of OUTSIDE AIR TEMPERATUREs. **3.** holdover time published in the holdover tables as derived from regression analysis of endurance times. **4.** a holdover time generated by a holdover time determination system. **5.** a holdover time estimated by the pilot-in-command based on situational awareness and the holdover time guidelines. **6.** for flight operations, the objective of holdover time is that it be equal to or greater than the estimated time from start of anti-icing to start of takeoff based on existing weather conditions. – See VISUAL FAILURE, SITUATIONAL AWARENESS. Compare ENDURANCE TIME, ALLOWANCE TIME, PROTECTION TIME.[75,76,82,84,112,135,176,178,188,189,208,214,216] [EASA EU Reg, EASA SIB 2008-09, FAA AC120-60B, FAA AC 150/5300-14D, ICAO 9640, Myers, SAE ARP5718, SAE ARP6207, SAE AS6285, SAE AS6286, Southwest FOM, TC 622.11, TC TP 14052]

holdover time determination system (HOTDS), a near real-time automated system that samples numerous weather conditions and uses these in conjunction with holdover time regression curves for specific deicing/anti-icing fluids to produce a HOLDOVER TIME DETERMINATION SYSTEM REPORT.[208,214,216] [TC AC 700-061, TC 622.11, TC TP 104052]

holdover time determination system report (HOTDR), a holdover time generated by a HOLDOVER TIME DETERMINATION SYSTEM.[214] [TC 622.11]

holdover time guideline, a table with holdover times for various precipitation conditions and temperatures along with cautions and notes giving guidance to deicing crew and flightcrew. – Synonym: HOLDOVER TIME TABLE. See HOLDOVER TIME GUIDELINES.

holdover time guidelines, **1.** plural of holdover time guideline. **2**. set of holdover time guidelines published annually by the FAA and Transport Canada along with other ground deicing guidance such as adjusted holdover times guidelines, allowance times, adjusted allowance time guidelines, FLUID APPLICATION GUIDELINES, list of qualified fluids, fluid qualification expiry dates, fluid

manufacturer viscosity measurement methods, snowfall intensity vs visibility table, list of testing laboratories, and list of fluid manufacturers. – See HOLDOVER TIME GUIDELINE, QUALIFICATION EXPIRY DATE. [89,135,162,176,178,188,212,216] [FAA HOT, Myers, SAE AIR6232, SAE ARP5718, SAE ARP6207, SAE AS6285, TC HOT, TC TP 14052]

holdover time range, the time interval given numerically in hours and minutes by the two holdover times presented in a holdover time table for a given precipitation for a given temperature range; *the holdover time range for Type I on aluminum surfaces for freezing drizzle at -3 °C and above is 0:09–0:13*.[82,89,212] [FAA 120-60B, FAA HOT, TC HOT]

holdover time regression curve, graphical representation of temperature and PRECIPITATION RATE generated in REGRESSION ANALYSIS using power law based models.[208] [TC AC700-061]

holdover time table, see HOLDOVER TIME GUIDELINE.[189] [SAE AS6286]

holdover time tables, see HOLDOVER TIME GUIDELINES.[81,214,216] [FAA AC 120-112, TC 622.11, TC TP 14052]

horizontal stabilizer, [aircraft components] a fixed stabilizing surface part of the HORIZONTAL TAIL.[198] [Shevell]

horizontal tail, [aircraft components] a stabilizing surface at the rear of the aircraft often divided into smaller parts, such as a forward fixed part called the HORIZONTAL STABILIZER and a moveable control surface called the ELEVATOR.[198] [Shevell]

hotel mode, activating the propeller brake allowing the engine to run while the propeller is stationary; *hotel mode allows engines-on deicing*.[29,30,219] [ATR42-300, ATR42-500, TSB]

human factors, 1. [psychology] the considerations to be made when designing, evaluating, or optimizing systems for human use, especially with regard to safety, efficiency, and comfort. **2.** [aviation] multidisciplinary effort to generate and compile information about human capabilities and limitations and apply that information to equipment, systems, facilities, procedures, jobs, environments, training, staffing, and personnel management for safe, comfortable, and effective human performance.[13,93] [APA, FAA HF]

hydrogen embrittlement, **1.** [metallurgy] a phenomenon where hydrogen is absorbed and diffuses in metals, leading to a decrease in mechanical properties such as ductility, toughness, and strength, and contributing to crack growth, fracture initiation, and ultimately catastrophic failure of high strength materials. **2.** [aircraft deicing fluids, runway deicing products**]** hydrogen embrittlement is included in the requirements for deicing/anti-icing fluids and is generally classified under MATERIALS COMPATIBILITY. **3.** [deicing fluids] hydrogen embrittlement is tested according to ASTM F519.[21,165,167,168,169,201] [ASTM F519, SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS 1435, Sobola]

hydrometeors, [meteorology] atmospheric water in any form, whether as solid, liquid or vapor.[74] [Dunlop]

hydrophilic, having an affinity for water.[195] [Schaschke]

hydrophilic surface, [surface chemistry] a surface producing a CONTACT ANGLE of $\theta < 90$ degrees.[162] [SAE AIR6232]

hydrophobic, lacking an affinity for water.[195] [Schaschke]

hydrophobic surface, [surface chemistry] a surface producing a CONTACT ANGLE of $\theta > 90$ degrees.[162] [SAE AIR6232]

hygroscopic, describing a substance that can absorb and retain water.[195] [Schaschke]

ice, **1.** the solid PHASE of water. **2.** [runway contaminants] the solid FORM of frozen water.[83,135,216] [FAA AC 150/5200-30D, Myers, TC TP 14052]

ice accretion, see ACCRETION ICE.

ice crystals, **1.** [meteorology] a fall of unbranched (snow crystals are branched) ice crystals in the form of needles, columns, or plates. **2.** a precipitation with METAR CODE IC. **3.** [aircraft deicing] a precipitation condition that has the same holdover times as FREEZING FOG and FREEZING MIST. – Synonym: DIAMOND DUST (METAR code IC).[89,142,212] [FAA HOT, NOAA FMH-1, TC HOT]

ice crystals mixed with freezing fog or mist, a precipitation condition used with the holdover time of FREEZING FOG.[89,212] [FAA HOT, TC HOT]

ice fog, [meteorology] a type of fog, composed of suspended particles of ice, partly ice crystals 20 to 100 μm in diameter but chiefly when dense, ice crystals 12–20 μm in diameter. – Compare FOG.[11] [AMS Glossary].

ice melting capacity, [runway deicing products] the ratio of the mass of ice melted divided by the mass of the runway deicing product as performed in the ICE MELTING TEST.[184] [SAE AS6170]

ice melting test, **1.** [runway deicing products] a quantitative comparative test to evaluate the amount of ice melted by a runway deicing product as a function of time and temperature. The tests are performed with the runway deicing product and a reference control solution, potassium acetate 25% weight/weight, at -2 °C and -10 °C and for 5, 10 and 30 minutes. The output of this test is the ICE MELTING CAPACITY which is the (mass of ice melted)/(mass of runway deicing product) and presented in table form and in a graph comparing ice melting capacity of the tested product to that of the control solution. **2**. a DETERMINE AND REPORT TEST for runway deicing products in AMS1431 and AMS1435. – Compare ICE PENETRATION TEST, ICE UNDERCUTTING TEST.[168,169,185] [SAE AMS1431, SAE AMS1435, SAE AS6170]

ice nucleus, [meteorology] any airborne particle that serves as a nucleus leading to the formation of ice crystals without first forming water droplets. – Synonym: DEPOSITION NUCLEUS.[11] [AMS Glossary]

ice pellets, **1.** [meteorology] transparent or translucent particles of ice that are round or irregular, rarely conical, and have a diameter of 5 mm (0.2 inch) or less. Ice pellets consist of frozen raindrops or largely melted and refrozen snowflakes and may or may not have a liquid core. **2.** METAR CODE for ice pellets PL (formerly PE). **3.** [aircraft deicing] a precipitation with allowance times. –

See ALLOWANCE TIME.[56,112,142,188,189,203,216] [ICAO 9640, MANOBS, NOAA FMH-1, SAE AS6285, SAE AS6286, SIAGDP, TC TP 14052]

ice penetration test, **1.** [runway deicing products] a quantitative comparative test to evaluate the amount of ice penetration by a runway deicing product as a function of time and temperature. The tests are performed with the runway deicing product and a reference control solution, potassium acetate 25% weight/weight, at -2 °C and -10 °C and for 5, 10 and 30 minutes. The tests are done in quadruplicate using four test tubes for the test solution and the control solution. The output of this test is the ice penetration average in mm for each set of four test tubes and presented in table form and in a graph comparing ice penetration of the tested product and that of the control solution. **2**. a DETERMINE AND REPORT TEST for runway deicing products in AMS1431 and AMS1435. – Compare ICE MELTING TEST, ICE UNDERCUTTING TEST.[168,169,187] [SAE AMS1431, SAE AMS1435, SAE AS6211]

ice protection system (IPS), **1.** system or systems that must demonstrate that an aircraft is capable of operating safely in-flight in continuous maximum and intermittent maximum icing conditions, as defined by regulators. In-flight ice protections systems only protect selected surfaces of the aircraft either by shedding accreted ice or preventing ice accumulation. **2.** an ice protection system may be categorized as IN-FLIGHT DEICING ICE PROTECTION SYSTEM or IN-FLIGHT ANTI-ICING ICE PROTECTION SYSTEM. **3.** ice protection systems may protect several components of the aircraft such as leading edges of wings, leading edges of the vertical stabilizer and horizontal stabilizer, windscreens, flight instruments, sensors, engine inlets, propellers, etc. **4**. an individual aircraft may employ various types of ice protection systems (bleed air, electrical, pneumatic, freezing point depressant) to safeguard all areas requiring protection. **5.** in-flight ice protection systems are not designed to perform ground deicing/anti-icing. – See EVAPORATIVE ICE PROTECTION SYSTEM, BLEED AIR ICE PROTECTION SYSTEM, FREEZING POINT DEPRESSANT ICE PROTECTION SYSTEM (colloquially known as WEEPING WING, or commercially known as TKS ICE PROTECTION SYSTEM), DEICING BOOT, ELECTROTHERMAL ICE PROTECTION SYSTEM, ELECTROIMPACT ICE DETECTION SYSTEM.[3,59,80] [14 CFR § 23.1419, CAV, FAA AC 91-74B]

ice undercutting test, **1.** [runway deicing products] a quantitative comparative test to evaluate the amount of ice undercutting by a runway deicing product as a function of time and temperature. The tests are performed with the runway deicing product and a reference control solution, potassium acetate 50% weight/weight, at -2 °C and -10 °C and for 5, 10 and 30 minutes. The output of this test is the ice undercutting area presented in table form and in a graph comparing ice undercutting area of the tested product and that of the control solution. **2**. a DETERMINE AND REPORT TEST for runway deicing products in AMS1431 and AMS1435. – Compare ICE MELTING TEST, ICE PENETRATION TEST.[168,169,186] [SAE AMS1431, SAE AMS1435, SAE AS6172]

icehouse, **1.** the control center at a deicing facility that coordinates and monitors all operations. **2.** the building that houses the control center.[175,181,216] [SAE ARP5660, SAE AS5635, TC TP 14052]

iceman, **1.** synonym for DEICING COORDINATOR. **2.** callsign assigned to the deicing coordinator at any deicing facility including, CENTRAL DEICING FACILITY, DESIGNATED DEICING FACILITY, TERMINAL DEICING FACILITY, REMOTE DEICING FACILITY, or DEICING BAY.[175] [SAE ARP5660]

icephobic surface, a surface producing a reduction in ice adhesion.[162] [SAE AIR6232]

icing conditions, a combination of GROUND ICING CONDITIONS and IN-FLIGHT ICING CONDITIONS.

illuminance, the amount of visible light power incident per unit area of a surface measured in lux (lumens/meter^2) or foot-candles (lumens/foot^2).[182] [SAE AS5681]

impact ice, colloquial name for ice forming on aircraft in flight, mainly because of supercooled water droplets, freezing of liquid water, or the transition of water vapor directly to ice. – Synonym: ACCRETION ICE. See IN-FLIGHT ICING, SUPERCOOLED WATER, RESIDUAL ICE, INTERCYCLE ICE, RUNBACK ICE.

impingement, **1.** [mechanical engineering] fluid striking a surface. **2.** [aircraft deicing] a cause of permanent (irreversible) viscosity reduction when Type II//III/IV hit a surface with excessive force (e.g., a sample bottle held too close to a nozzle). – See SHEAR DEGRADATION, SHEAR FORCE.[28] [Atkins]

in-flight anti-icing ice protection system, **1.** an ICE PROTECTION SYSTEM designed to prevent ice accretion over the protected surfaces; *for example BLEED AIR ICE PROTECTION SYSTEMs or FREEZING POINT DEPRESSANT ICE PROTECTION SYSTEMs, also known as WEEPING WINGs.* **2.** in-flight ice anti-deicing ice protection systems are not designed to perform ground deicing/anti-icing. – See EVAPORATIVE ICE PROTECTION SYSTEM. Compare IN-FLIGHT DEICING ICE PROTECTION SYSTEM.[80] [FAA AC 91-74B].

in-flight deicing ice protection system, **1.** an ICE PROTECTION SYSTEM designed to shed accreted ice from the protected surface areas by breaking the bond between the ice and the protected surface. Since in-flight deicing systems are meant to be activated after encountering in-flight icing conditions or to operate intermittently in cycles, in-flight deicing ice protection systems allow a certain amount of ice accretion in between cycles; thus, the protected surface is never entirely clean. *Examples of in-flight deicing systems are pneumatic DEICING BOOTs, ELECTROTHERMAL ICE PROTECTION SYSTEMs, and ELECTROIMPACT ICE PROTECTION SYSTEMs.* **2.** in-flight ice deicing ice protection systems are not designed to perform ground deicing.– Compare IN-FLIGHT ANTI-ICING ICE PROTECTION SYSTEM. See PROPELLER ELECTROTHERMAL ICE PROTECTION SYSTEM, INTERCYCLE ICE, RESIDUAL ICE, RUNBACK ICE.[80,174] [FAA AC 91-74B, SAE ARP5624]

in-flight icing, ice forming on aircraft in flight (colloquially called IMPACT ICE), mainly as a result of supercooled water droplets, freezing of liquid water, or the transition of water vapor directly to ice – See IN-FLIGHT ICING CONDITIONS. ICE PROTECTION SYSTEM. Compare GROUND ICING, ENGINE ICING, PROPELLER ICING.[219] [TSB]

in-flight icing conditions, **1.** [FAA] conditions when there is visible moisture at or below a static air temperature of 5 °C or a total air temperature of 10 °C, unless the approved Airplane Flight Manual provides another definition. **2.** conditions when the TOTAL AIR TEMPERATURE is 10° C or below and VISIBLE MOISTURE is present. – Synonym: CONDITIONS CONDUCIVE TO AIRFRAME ICING IN-FLIGHT. Compare GROUND ICING CONDITIONS, AIRCRAFT ICING CONDITIONS. See IN-FLIGHT ICING, GROUND ICING, ENGINE ICING, PROPELLER ICING, ICE PROTECTION SYSTEM.[7,202] [14 CFR § 121.321, SW FOM]

independent laboratory, a subset of INDEPENDENT TEST FACILITY.

independent test facility, **1.** a research laboratory or test facility that operates without affiliation to manufacturers, suppliers, or developers of the products it evaluates. **2.** [aircraft deicing, runway deicing] a test facility not involved in the development, formulation, or commercialization of deicing products ensuring that its testing, analysis, and qualification processes remain objective, unbiased, and compliant with industry standards. Independent test facilities play a critical role in verifying the performance, environmental impact, and regulatory compliance of deicing and anti-icing products, adhering to standardized methodologies established by industry organizations and regulators. – Quasi synonym: INDEPENDENT LABORATORY.[165,167] [SAE AMS1424, SAE AMS1428]

index of refraction, see REFRACTIVE INDEX.[127] [Guide]

infrared heat deicing, a method of deicing using infrared (IR) thermal energy.[216] [TC TP 14052]

infrared temperature gun, colloquial name for INFRARED THERMOMETER.

infrared thermometer, **1.** an instrument used to indirectly measure surface temperature from a distance (non-contact) that works by measuring the emitted infrared radiation wavelength and power emitted by an object. **2.** [aircraft deicing] an instrument used to measure the temperature of fluid (usually Type I) coming out of a nozzle. This method of measuring is subject to error as a) it needs adjustment for the surface being measured, b) it does not measure internal temperature but rather surface temperature, and c) it is affected by frost, moisture, steam and rapid changes in temperature. When inaccuracy or error is suspected, a measurement with contact, such as with a BULB THERMOMETER or THERMOCOUPLE, is preferred. – Colloquial names for infrared thermometer: INFRARED TEMPERATURE GUN, LASER THERMOMETER, POINT AND SHOOT THERMOMETER. See THERMOMETER.[63] [Claus]

initial aircraft deicing fluid qualification, see INITIAL QUALIFICATION.

initial climb, phase of flight that begins when the aircraft leaves the surface, and a climb pitch attitude has been established. Normally, it is considered complete when the airplane has reached a safe maneuvering altitude or an enroute climb has been established. See CLIMB, PITCH, ATTITUDE.[85] [FAA H-8083-3C]

initial qualification (IQ), **1.** [aircraft deicing fluids and runway deicing fluids] process by which a product is tested for all technical requirements of the specification and for which qualification test reports are issued. **2.** for Type I the initial qualification tests are described in AMS1424, for Type II/III/IV in AMS1428, for solid runway deicing products in AMS1431, and for liquid runway deicing products in AMS1435. **3.** to commercialize Type I fluids it is also necessary to perform endurance time testing described in ARP5945 to obtain holdover times—the entire qualification process is described in ARP6207. **4.** to commercialize Type II/III/IV fluids it is also necessary to perform endurance time testing described in ARP5485 to obtain holdover times—the entire qualification process is described in ARP5718. **5.** the first manufacturer to obtain an initial qualification for given product is the ORIGINAL MANUFACTURER or ORIGINAL VENDOR. **6.** initial qualification is subject to an expiration date which can be extended by performing a periodic requalification in a timely manner. **7.** initial qualification samples are often prepared in the laboratory. Thus, it is generally necessary to obtain not only an initial qualification but also to qualify a sample from a production unit as either a SITE QUALIFICATION or UNIT QUALIFICATION. –

See QUALIFICATION TEST REPORT, INITIAL SHIPMENT Compare PERIODIC REQUALIFICATION, MULTIPLE LOCATION QUALIFICATION.[165,167,168,169,173,176,177,178] [SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435, SAE ARP5485, SAE ARP5718, SAE ARP5945, SAE ARP6207].

initial qualification training, [aircraft deicing] mandatory training program that ensures that new personnel involved in deicing operations, including flightcrews, are instructed with the latest procedures, safety protocols, and best practices. *For example (taken from AS6286), this training covers topics such as basic knowledge of aircraft performance, the effects of frozen contamination on aircraft performance, the CLEAN AIRCRAFT CONCEPT, meteorological considerations for ice formation, how to check CRITICAL SURFACES, removal of FROZEN CONTAMINATION, deicing/anti-icing with fluids, characteristics of deicing/anti-icing fluids, types of fluid checks, deicing equipment, fluid application, HOLDOVER TIMES and ALLOWANCE TIMES, communication procedures, critical surfaces and instruments, safety precautions and HUMAN FACTORS, environmental impact and mitigation, deicing facility operations, quality management, local rules and restrictions, and airport procedures.* – Compare ANNUAL RECURRENT TRAINING.[88,189,214] [FAA General Info, SAE AS6286, TC 622.11]

initial runway deicing product qualification, see INITIAL QUALIFICATION.

initial shipment, [aircraft deicing fluids, runway deicing products] describes the shipment of deicing fluid or runway deicing product the first time it is shipped by a vendor (original manufacturer or licensee) from a production unit or site to a purchaser. The product from each site and/or production unit must be qualified before an initial shipment is made from that production unit or site. – See INITIAL QUALIFICATION, MULTIPLE LOCATION QUALIFICATION, SITE QUALIFICATION, UNIT QUALIFICATION.[165,167,168,169] [SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435]

inlet duct, [aircraft engine] a passage that directs and guides the incoming air towards the engine compressor section. It is typically located at the front of the engine, attached to the engine NACELLE. The inlet duct is susceptible to icing.

in-service limits, **1.** a set of quality control limits for fluid sampled from storage tanks, trucks, and nozzles of users, airlines or service providers. **2.** in-service limits are related to sales specification limits but take into consideration that in-service tests are measured with FIELD INSTRUMENTs whereas generally SALES SPECIFICATION tests use LABORATORY INSTRUMENTs. – Synonym: IN-USE LIMITS.[127,188] [Guide, SAE AS6285]

intake, [aircraft engine] the part of the engine that consists of the INLET DUCT, ENGINE INLET, and other components responsible for directing and channeling the incoming air into the ENGINE CORE. The engine intake is susceptible to icing.

intensity qualifier, [meteorology] a way to describe current weather in terms of its intensity. The intensity qualifiers are light (-), moderate (no METAR symbol used), and heavy (+); *light snow (-SN), moderate snow (SN), heavy snow (+SN)*.[142] [NOAA FMH-1]

intercycle ice, [in-flight ice protection] ice that accretes on a protected surface between IN-FLIGHT DEICING ICE PROTECTIONS SYSTEM cycles. – Compare RESIDUAL ICE, RUNBACK ICE.[174] [SAE ARP5624]

intermediate bulk container (IBC), an industrial grade container for handling, transporting and storing liquid containing of a capacity less than 3000 liters; common sizes are 1000 liters (about 275 USG) and 1200 liters (about 330 USG). IBCs are designed to be handled by forklifts or pallet jacks, and include a metal framework on the bottom that makes them easy to move and stack. – Synonym: TOTE.[32,217] [Basco, TC IBC]

interrupted deicing, see INTERRUPTED OPERATION.

interrupted operation, [aircraft deicing] a condition where aircraft deicing is stopped (e.g., a deicing unit runs out of fluid, the flightcrew needs to troubleshoot something) thus requiring communications between the flightcrew and groundcrew as well as various actions by both crews. – Synonym: INTERRUPTED DEICING.[188] [SAE AS6285]

in-truck proportional mixing, a system on board a DEICING VEHICLE to mix a deicing/anti-icing fluid with water to achieve a target concentration or freezing point. – Compare DEICING FLUID BLENDER. Quasi synonym: PROPORTIONAL MIXING.

in-use limits, see IN-SERVICE LIMITS (the preferred term is in-service limit).[127,179] [Guide, SAE AS6285]

inversion, 1. [meteorology] a departure from the usual decrease or increase of the value of an atmospheric property (e.g., temperature) with ALTITUDE; also, the layer through which this departure occurs (the inversion layer), or the lowest altitude at which the departure is found (the base of the inversion). **2.** [meteorology] FREEZING RAIN occurs when rain falls through a layer of freezing air near the ground, often due to a temperature inversion. This inversion, where warm air sits above cold air, causes snowflakes to melt into rain, and this rain then refreezes upon contact with sub-freezing surfaces.[8,124] [Ahrens, Landolt 2025]

irregularity, **1.** something that is not according to usual rules or what is expected, and often not acceptable. **2.** something suggesting a lack of uniformity or consistency, implying deviation from a usual pattern. **3.** [aircraft deicing] SAE AS6285 requires service providers and fluid manufacturers to have procedures to deal with nonconformities, anomalies, discrepancies, and irregularities. – Compare ANOMALY, DISCREPANCY, NONCONFORMITY.[53,188] [Cambridge, SAE AS6285]

is/are required, **1.** required. **2.** [aircraft deicing regulatory] mandatory term to convey the intent of meeting a regulatory requirement or other requirement, e.g., SAE STANDARD. – See MUST, SHALL.[89,212] [FAA HOT, TC HOT]

Ishikawa diagram, see FISHBONE DIAGRAM.

ISO container, see ISOTAINER.

ISO tank container, see ISOTAINER,

isopropanol, **1.** [chemistry] Chemical Abstract registry number 67-63-0, alternate names: isopropyl alcohol, dimethyl carbinol, IPA; molecular formula C_3H_8O; mol wt 60.10, fp -89.5 °C, bp 82.5 °C, flash point closed cup 11.7 °C, flammable. **2.** [aircraft in-flight ice protection] a FREEZING POINT DEPRESSANT used in the formulation for FREEZING POINT DEPRESSANT ICE PROTECTION SYSTEMs (weeping wing). **3.** isopropanol is never used as a freezing point depressant in ground aircraft deicing/anti-icing fluids because of its flammability.– Compare METHANOL, ETHANOL, ETHYLENE GLYCOL[144] [Merck Index]

isopropyl alcohol, see ISOPROPANOL.

ISOtainer, an intermodal container for liquids or gases, typically with a capacity of 14,000 to 28,000 liters (about 3700 to 6900 USG). Synonyms: ISO container or ISO tank container.[64] [Container]

issue date, [SAE] see SAE STANDARD.

key performance indicator (KPI), a quantifiable measure used to evaluate the success of an organization, employee, operation, etc., in meeting objectives for performance.[175] [SAE ARP5660]

laboratory instrument, [chemistry] a measurement instrument designed for use within controlled laboratory conditions, used for precise and accurate measurement, typically more complex and sensitive than field instruments; *an Abbe refractometer*, *a Brookfield viscometer*, *and a RHEOMETER are examples of laboratory instruments* – Compare FIELD INSTRUMENT. See FIELD TEST.

laminar flow, **1.** [qualitative definition] flow regime of a fluid (gas or liquid) that flows in the direction of flow, smoothly and regularly, without fluctuations or turbulence. In laminar flow the fluid particles flow in layers, each layer moving smoothly past the other with minimal lateral mixing. **2.** in laminar flow, viscous forces dominate over the kinetic energy forces. The flow is predictable and stable. **3.** increased flow rates or irregularities, such as roughness, on the surface over which the particles flow can initiate disturbances and create turbulence. – Compare TURBULENT FLOW. See TRANSITION, REYNOLDS NUMBER.[28,132,195,198] [Atkins, MW, Schaschke, Shevell]

laboratory batch, **1.** [manufacturing] a small scale limited quantity of product that is made in a laboratory setting. Laboratory batches play a critical role in ensuring the feasibility and quality of product before a full scale industrial scale begins. **2.** [aircraft deicing fluids] the INITIAL QUALIFICATION of Type I//II/III/IV fluids is made on product produced in the laboratory. It must be followed by a production UNIT QUALIFICATION or SITE QUALIFICATION. – Compare PRODUCTION BATCH. See BATCH, LOT.[165,167] [SAE AMS1424, SAE AMS1428]

large jet transport aircraft, see HIGH SPEED AIRCRAFT.

large turboprop aircraft, see MIDDLE SPEED AIRCRAFT.

laser thermometer, colloquial name for INFRARED THERMOMETER.

latent failure, [fluid failure] a latent failure is one that is inherently undetected when it occurs.[182] [SAE AS5681]

latent heat, **1.** [chemistry] the quantity of heat released or absorbed as a substance changes phase at constant temperature, e.g., from solid to liquid, from liquid to solid, from liquid to gas or vapor, from gas or vapor to liquid, from solid to gas or vapor, from gas or vapor to solid (heat released). **2.** [meteorology] latent heat as it applies to the three phases of water: ice, liquid water and water vapor. **3.** [aircraft deicing] in the formation of frost on an aircraft the energy released by the freezing of water or direct DEPOSITION of ice can slow the initial rate of freezing or deposition but it will not prevent it as this latent heat will be diffused by convection or conduction.[74,152,219] [Dunlop, Rennie, TSB]

latent heat of fusion, latent heat of a substance changing phase from solid to liquid or liquid to solid.

latent heat of sublimation, latent heat of a substance changing phase from solid to gas or vapor, or gas or vapor to solid.

latent heat of vaporization, latent heat of a substance changing phase from liquid to gas or vapor, or from gas or vapor to liquid.

lateral axis, [aerodynamics] an imaginary line passing through the center of gravity of an airplane and extending across the airplane from wingtip to wingtip. See AXES OF AN AIRCRAFT.[85] [FAA H-8083-3C]

layered contaminant [runway contaminant], a combination of the definitions for each of the contaminants. For example, the definition of "wet snow over ice" is "snow that has grains coated with liquid water, which bonds the mass together, but that has no excess water in the pore space" over "the solid form of frozen water." [83] [FAA 150-5200-30D]

leading edge, **1.** [aircraft component] the part of the AIRFOIL that meets the airflow first; *the leading edge of the wing, the leading edge of the horizontal stabilizer, the leading edge of the vertical stabilizer*. **2.** the front part of an airfoil upon which an oncoming flow divides.[28, 85] [Atkins, FAA H-8083-3C]

lethal concentration 50% (LC_{50}), [ecotoxicity] the concentration that causes death in 50% of the test population. – Compare EFFECTIVE CONCENTRATION 50%. See AQUATIC TOXICITY.

licensee, **1.** [aircraft deicing fluids and runway deicing products] an organization, independent from the original manufacturer, that has obtained an authorization (license) from the ORIGINAL MANUFACTURER to produce an aircraft deicing fluid or a runway deicing product. The licensee must qualify the product manufactured at its site(s); *a licensee purchasing an additive package from an original manufacturer to produce a recycled Type I fluid*. **2.** for Type I aircraft deicing fluids the licensee site qualification consists of a) an initial qualification if the manufacturing process (including materials) is not essentially the same as of the original fluid manufacturer or b) aerodynamic test(s) and a single water spray endurance time (three panels only) if the manufacturing process is essentially the same as the original manufacturer. **3.** for Type II/III/IV aircraft deicing fluids the licensee site qualification consists of a) an initial qualification if the

manufacturing process (including materials) is not essentially the same as of the original fluid manufacturer or b) aerodynamic test(s), a single water spray endurance time (three panels only), and viscosity if the manufacturing process is essentially the same as the original manufacturer. **4.** for runway deicing products, the licensee site qualification consists of an initial qualification. – See INITIAL QUALIFICATION, PERIODIC REQUALIFICATION, MULTIPLE LOCATION QUALIFICATION, SUBCONTRACTOR, ORIGINAL MANUFACTURER. Compare VENDOR, DISTRIBUTOR, PURCHASER.[165,167,168,169] [SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435]

lift, **1.** [aerodynamics] an aerodynamic force acting on the aircraft (or body) in a direction perpendicular (normal or vertically upward) to its relative motion through the air (or fluid). **2**. one of the main four forces acting upon an aircraft, the others being DRAG, THRUST, and WEIGHT.[28,85,137,198] [Atkins, FAA H-8083-3C, NASA Lift, Shevell]

liftoff, [aerodynamics] when the wings are lifting the aircraft off the ground. This is generally the result of the pilot rotating the nose up to increase the ANGLE OF ATTACK. – See LIFTOFF SPEED.[85] [FAA H-8083-3C]

liftoff speed (V_{lof}), [aerodynamics] the speed at which the aircraft becomes airborne (i.e., leaves the ground). – See MINIMUM CONTROL SPEED, TAKEOFF DECISION SPEED, ROTATION SPEED, MINIMUM UNSTICK SPEED, TAKEOFF SAFETY SPEED.[183,198] [SAE AS5900, Shevell]

light, see INTENSITY QUALIFIER.

light drizzle, see DRIZZLE.

light freezing drizzle, see FREEZING DRIZZLE.

light freezing rain, see FREEZING RAIN.

light hoarfrost, see THIN HOARFROST.

light rain, see RAIN.

light snow, see SNOW.

light snow grains, see SNOW GRAINS.

light snow pellets, see SNOW PELLETS.

limited nonconformity, a NONCONFORMITY whose extent impacts at least an entire station (e.g., all storage tanks with off-spec fluid at a station) but less than the entire system. – Compare LOCAL NONCONFORMITY, SYSTEMIC NONCONFORMITY.[188] [AS6285]

liquefaction, the process of conversion of a gas into a liquid using vapor compression, refrigeration, ADIABATIC expansion, or gas expansion through a porous plug. The process of dissolving a salt in water is dissolution, not liquefaction. – Compare DISSOLUTION.[127,152] [Guide, Rennie]

liquid filled temperature gauge, a gauge in which liquid expands as temperature increases, thereby creating a mechanical motion which is then read on an analog temperature numbered scale or digital readout. – See TEMPERATURE GAUGE.

liquid water equivalent (LWE) **rate**, the real-time rate of liquid water equivalent accumulation of freezing or frozen precipitation in $g/dm^2/h$ where liquid water equivalent refers to the amount of water in freezing precipitation or the amount of liquid water produced if the frozen precipitation were melted.[81] [FAA 120-112]

liquid water equivalent system (LWES), **1.** an automated weather measurement system that determines the real-time liquid water equivalent PRECIPITATION RATE in conditions of frozen or freezing precipitation and provides flightcrews with continuously updated information on the fluid holdover time under varying weather conditions. **2.** when using a liquid equivalent system for the determination of holdover time, pilots should always consider METAR reports and visual observation to verify the LWES report. – See HOLDOVER TIME, ALLOWANCE TIME, METAR. [75,81,90,112] [EASA EU Reg, FAA 120-112, FAA InFO 25003, ICAO 9640]

list of fluids tested for anti-icing performance and aerodynamic acceptance, lists of fluids (Type I, II, III and IV) meant to be used with the holdover times published in the FAA and Transport Canada *Holdover Time Guidelines*. This list is updated at least annually. These lists are often referred to as the FAA/TRANSPORT CANADA LISTS OF FLUIDS – Compare LIST OF VALIDATED FLUIDS.[89,212] [FAA HOT, TC HOT]

list of validated fluids, a list of fluids meant to be used with the allowance times published in the FAA and Transport Canada *Holdover Time Guidelines*. This list is updated at least annually. Generally, the FAA list and the Transport Canada list of validated fluids are identical – Compare FAA/TRANSPORT CANADA LISTS OF FLUIDS. See VALIDATED FLUID.[89,212] [FAA HOT, TC HOT]

local nonconformity, a NONCONFORMITY whose extent impacts less than an entire station (e.g., a number of deicing units with off spec fluid at a station). – Compare LIMITED NONCONFORMITY, SYSTEMIC NONCONFORMITY.[188] [AS6285]

local frost, [aircraft deicing] the limited formation of frost in localized wing areas that have been cooled by cold fuel or large masses of cold metal in the wing structure; this type of frost does not cover the entire wing. – See COLD-SOAKED FUEL FROST.[188] [SAE AS6285]

longitudinal axis, an imaginary line through an aircraft from nose to tail, passing through its center of gravity. Movement of the AILERONS rotates an airplane about its longitudinal axis. – Synonym: ROLL AXIS. See AXES OF AN AIRCRAFT.[85] [FAA H-8083-3C]

loss of gloss, [fluid failure] a dulling of the surface reflectivity, which is a symptom of the contamination of fluid. A freshly applied deicing/anti-icing fluid is generally glossy and as it starts to absorb contamination, it generally lose gloss. However, when subjected to freezing liquid contamination such as light freezing rain, the fluid surface upon failure can become glossy again. Therefore, there is a potential recognition error of glossy surfaces. As the fluid starts to fail, it is easier to see the contrast between the contaminated and uncontaminated surfaces. To differentiate between a fully uncontaminated and fully contaminated surface requires good lighting and the

ability of the observer to find the right angle of vision. – See STANDARD PLATE FAILURE.[60,69] [Chaput. Dawson 1998]

lot, **1.** a quantity of material assumed to be a single population for sampling purposes; a lot may consist of one or several batches. **2.** a lot will be assigned a LOT NUMBER which ensures traceability. – Compare BATCH. See LOT ACCEPTANCE TESTS.[127,106,160,165,167.168,169] [Guide, Hibbert, SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435]

lot acceptance tests, **1.** series of tests conducted on a sample from a production lot to determine if it is acceptable or not. **2.** [aircraft deicing fluids, runway deicing products] the series of tests on a REPRESENTATIVE SAMPLE as defined in AMS1424, AMS1428, AMS1431 or AMS1435 to accept a production lot. These specifications require the lot acceptance test results to be written up in a CERTIFICATE OF ANALYSIS. **3.** [aircraft deicing fluids, runway deicing products] the manufacturers of aircraft deicing fluids and runway deicing products set up their lot acceptance criteria in a SALES SPECIFICATION. The production lots are tested and the results documented in certificate of analysis. – See LOT, BATCH, PRODUCTION BATCH, PRODUCTION LOT.[70,165,167,168,169] [DAU, SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435]

lot number, a number assigned to a LOT to ensure traceability.

low concentration spent deicing fluid, fluid with glycol concentration suitable (such as snow melting, subsurface retention, and rain events) for sending to sanitary sewers (with appropriate agreement between deicing service provider and the water treatment plant), or to a waste disposal provider. – See SPENT DEICING FLUID.[172] [SAE ARP4902]

low shear rate viscosity, **1.** (aircraft deicing fluids) a VISCOSITY measured on Type II/III/IV fluids at low shear rate using a Brookfield ROTATIONAL VISCOMETER (or equivalent) at a ROTATIONAL RATE of 0.3 rpm. **2.** the other measurement parameters are set by the fluid manufacturers and must be reported with the VISCOSITY value. **3.** the measurement parameters are: a) the type of fluid container (low form Griffin beaker, tall form (Berzelius) beaker, SMALL SAMPLE ADAPTER, or big sample adapter), b) the SPINDLE (LV-1 with or without GUARD LEG, LV2-disc with or without guard leg, SC1-31/13R, or SC4-34/13R), c) the fluid volume (575 mL, 425 mL, 55 mL, 60 mL, 135 mL, 10 mL, 9 mL), d) rotational rate of 0.3 rpm, e) temperature (0 or 20 °C), f) duration of rotation (10.0, 15.00, 30.0, 33.3, or 65 minutes). **3.** the respective shear rates for LV1 with guard leg, SC4-31/13R, SC434/13R are 0.066, 0.102, and 0.084 s^{-1}; the shear rate for the LV2-disc is undefined. **4.** the fluid manufacturer low shear rate viscosity measurement parameters are published in the FAA and Transport Canada *Holdover Time Guidelines*. **5.** the low shear rate viscosity as measured on the qualification sample used to generate the endurance times for a given fluid is known as its LOWEST ON-WING VISCOSITY. **6.** the low shear rate viscosity of Type II/II/IV fluids is considered (an imperfect) SURROGATE for the WATER SPRAY ENDURANCE TIME, ENDURANCE TIMEs and HOLDOVER TIMEs. **7.** the low shear rate viscosity from samples in the field are measured regularly to ensure they are equal to or above the lowest on-wing viscosity. **8.** fluid manufacturers do set in their SALES SPECIFICATION a lower limit on the low shear rate viscosity of their THICKENED FLUIDs.[14,46,89,165,167,173,176,183,184,188,191] [Ametek Brookfield, Brookfield Spindles, FAA HOT, SAE AMS1428, SAE ARP5718, SAE ARP5485, SAE AS5900, SAE AS5901, SAE AS6285, SAE AS9968]

low speed aircraft, **1.** colloquial term for COMMUTER TURBOPROP AIRCRAFT as described in the aerodynamic acceptance test standard AS5900. **2.** an aircraft category defined by each aircraft manufacturer based on specific aircraft performance. **–** Compare HIGH SPEED AIRCRAFT, MIDDLE SPEED AIRCRAFT. See LOW SPEED RAMP TEST**.**[183] [SAE AS5900]

low speed ramp (LSR), see LOW SPEED RAMP TEST.

low speed ramp test, **1.** an AERODYNAMIC ACCEPTANCE TEST performed to simulate COMMUTER TURBOPROP AIRCRAFT takeoffs, with rotation speeds between 60 knots and 100 knots, and a time from brake release to ROTATION SPEED between 15 seconds and 20 seconds. **2.** a test is conducted at 35 m/s (70 knots), representing the liftoff speed (Vlof), after a 17 second acceleration at 2.1 m/s^2. **3.** a test defined in AS5900. – Compare HIGH SPEED RAMP TEST, MIDDLE SPEED RAMP TEST.[165,167,183] [SAE AMS1424, SAE AMS1428, SAE AS5900]

low viscosity initial qualification sample, **1.** [thickened fluids] upon initial qualification of Type II/III/IV fluids according to AMS1428, two samples have to be submitted to the testing laboratory performing the anti-icing performance test and the aerodynamic acceptance test (and other tests). The sample with the lower 0.3 rpm viscosity is designated the low viscosity initial qualification sample while the other is called the high viscosity initial qualification sample. The low viscosity initial qualification sample was formerly known as the LOW VISCOSITY PREPRODUCTION SAMPLE or simply the LOW VISCOSITY SAMPLE. **2.** the low viscosity initial qualification sample is normally laboratory produced in a sufficient quantity perform the initial qualification tests. **3.** the 0.3 rpm viscosity of the low viscosity initial qualification sample becomes that lowest viscosity that a fluid manufacturer can select for its sales specification. **4.** the low viscosity initial qualification sample is not the same as the LOWEST ON-WING VISCOSITY SAMPLE on which endurance times for the determination of holdover times are measured, as described in ARP5718. – Compare HIGH VISCOSITY INITIAL QUALIFICATION SAMPLE.[176,167] [SAE AMS1428, SAE ARP5718]

low viscosity preproduction sample, former name of the LOW VISCOSITY INITIAL QUALIFICATION SAMPLE.[176,167] [SAE AMS1428, SAE ARP5718]

low viscosity sample, **1.** [thickened fluids] a sample whose viscosity is low. **2.** short for the LOW VISCOSITY INITIAL QUALIFICATION SAMPLE.[167] [SAE AMS1428]

low visibility operations (LVO), [FAA] airport operations conducted at visibilities less than runway visual range (RVR) 1200.[91,202] [FAA Order 8000.94, SW FOM]

lower sales specification viscosity limit, viscosity set by the fluid manufacturer for its sales specification. This viscosity must be equal to or higher than the viscosity of the AMS1428 LOW VISCOSITY INITIAL QUALIFICATION SAMPLE. The viscosity of AMS1428 low viscosity initial qualification sample is not the lowest on-wing viscosity. – See LOWEST ON-WING VISCOSITY, SALES SPECIFICATION.[176] [SAE ARP5718]

lowest aerodynamics acceptance temperature (LAAT), **1.** [aircraft deicing fluids] the lowest temperature at which a Type I/II/III/IV fluid does not cause unacceptable lift loss as measured in the AERODYNAMIC ACCEPTANCE TEST for the HIGH SPEED RAMP, MIDDLE SPEED RAMP or LOW SPEED RAMP. **2.** the lowest aerodynamic acceptance temperature may be measured by the aerodynamic acceptance test with the high speed ramp, and/or middle speed ramp, and/or low speed ramp. **3.** a

fluid may have more than one lowest aerodynamic acceptance temperature as it may have been tested in more than one ramp. – Compare LOWEST OPERATIONAL USE TEMPERATURE.[127,183] [Guide, SAE AS5900]

lowest on-wing viscosity (LOWV), **1.** the 0.3 rpm low shear rate viscosity as measured on a Type II/III/IV fluid sample that is used to test for endurance time and from which fluid-specific holdover time guidelines are derived. **2.** value reported in the FAA and Transport Canada *Holdover Time Guidelines* for each Type II/III/IV with the applicable measurement method. **3.** the inferior limit of viscosity of a Type II/III/IV fluid for which the applicable HOLDOVER TIME GUIDELINE or ALLOWANCE TIME TABLE can be used. – Compare HIGHEST ON-WING VISCOSITY. See SHEAR DEGRADATION, SURROGATE, LOW SHEAR RATE VISCOSITY, FLUID-SPECIFIC HOLDOVER TIME GUIDELINE.[162,176,188,216] [SAE AIR6232, SAE ARP5718, SAE AS6285, TC TP10452]

lowest on-wing viscosity sample, [thickened fluids] a sample made from a batch (normally a laboratory made batch) in a form expected to be supplied to users by the vendor whose viscosity has been reduced by the fluid manufacturer and sent to APS Aviation (on behalf of the FAA and Transport Canada) for endurance time testing to determine holdover times and for wind tunnel testing under ice pellet conditions to determine allowance times.[176] [SAE ARP5718]

lowest operational use temperature (LOUT), **1.** [aircraft deicing fluids] in broad terms, the lowest operational use temperature generally means the lowest ambient temperature (a SURROGATE for the aircraft surface temperature) at which a specific fluid may be used at a given concentration for a given type of aircraft (high speed, middle speed or low speed). There are exceptions to this general definition, for instance if the fluid concentration is above its highest operational use concentration, it cannot be used; when there is cold soaking one cannot assume that the aircraft surface temperature is equal to ambient temperature. **2.** the lowest operational use temperature needs to be determined for each specific fluid at the dilution to be used. In other words, when the specific fluid changes freezing point upon dilution or increased concentration, it may change the lowest operational use temperature. **3.** the formal definition of lowest operational use temperature is: for fluids whose glycol concentration is equal to or less than the concentration at which the AERODYNAMIC ACCEPTANCE TEST was performed (known as the HIGHEST OPERATIONAL USE CONCENTRATION), it is the higher (warmer) of a) the LOWEST AERODYNAMIC ACCEPTANCE TEMPERATURE at which the fluid meets the high speed, middle speed, or low speed AERODYNAMIC ACCEPTANCE TEST according to AS5900 for a given type of aircraft or b) the freezing point of the fluid plus the FREEZING POINT BUFFER of 10 °C (18 °F) for Type I fluid and 7 °C (13 °F) for Type II, III, or IV fluids. **4.** [aircraft deicing operations] the lowest operational use temperature is an operational value that must be determined by users (e.g., airlines, SERVICE PROVIDERs) of deicing/anti-icing fluids in the FIELD. For more details see TYPE I LOWEST OPERATIONAL USE TEMPERATURE and TYPE II/III/IV LOWEST OPERATIONAL USE TEMPERATURE. – Compare LOWEST AERODYNAMIC ACCEPTANCE TEMPERATURE. [75,76,88,89,178,179,188,190,203,212,216] [EASA EU Reg, EASA SIB 2008-29, FAA General Info, FAA HOT, SAE ARP6207, SAE ARP6852, SAE AS6332, SAE AS6285, SIAGDP, TC HOT, TC TP 14052]

lowest usable precipitation rate (LUPR), the lowest PRECIPITATION RATE at which an endurance time data set can be used to determine holdover times.[176] [SAE ARP5718]

mandatory documentation, [aircraft deicing fluids, runway deicing products] mandatory information presented in the form of a document. – Quasi synonym: MANDATORY INFORMATION.[165,167,168,169] [SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435]

mandatory information, [aircraft deicing fluids, runway deicing products] information that must be provided by the VENDOR that is neither subject to a DETERMINE AND REPORT TEST nor a PASS-FAIL TEST. For example, compositional information such as the FREEZING POINT DEPRESSANT must be known to determine if the fluid is glycol (conventional), glycol (non-conventional) or non-glycol based. Other examples of mandatory information are a SAFETY DATA SHEET and label information. – Quasi synonym: MANDATORY DOCUMENTATION.[165,167,168,169] [SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435]

maneuvering area, part of an airport used for the takeoff, landing and taxiing of aircraft, excluding APRONs.[216] [TC TP 14052]

material safety data sheet (MSDS), former name for safety data sheet. See SAFETY DATA SHEET.

materials compatibility, 1. [aircraft engineering] the ability of different materials used in the fabrication of or application on an aircraft to coexist and function together without causing issues such as performance degradation, safety risks, structural problems, corrosion or cosmetic issues. **2.** [aircraft deicing fluids, runway deicing products] the collective name given to technical requirements in AMS1424, AMS1428, AMS1431, and AMS1435 related to the effect of fluids on aircraft materials such as SANDWICH CORROSION, TOTAL IMMERSION CORROSION, CORROSION OF LOW-EMBRITTLING PLATE, STRESS-CORROSION RESISTANCE, HYDROGEN EMBRITTLEMENT, EFFECT ON TRANSPARENT PLASTICS, EFFECT ON PAINTED SURFACES, EFFECT ON UNPAINTED SURFACES, and RUNWAY CONCRETE SCALING RESISTANCE. – Synonym: EFFECT ON AIRCRAFT MATERIALS. See OPERATIONAL PROPERTY.[89,165,167,168,169,212] [FAA HOT, SAE AMS1424, SAE AMS1428, AMS1431, SAE AMS1435, TC HOT]

maximum detection angle, the maximum angle at which a REMOTE ON-GROUND ICE DETECTION SYSTEM sensor can directed and expected—without loss of functionality—to achieve the performance specified in AS5681.[182] [SAE AS5681]

maximum detection distance, the farthest distance from its point of monitoring that a REMOTE ON-GROUND ICE DETECTION SYSTEM sensor can be while continuing to meet the performance specified in AS5681.[182] [SAE AS5681]

maximum on-wing viscosity, replaced by HIGHEST ON-WING VISCOSITY (do not use the expression maximum on-wing viscosity; the HARMONIZED TERM is highest on-wing viscosity).

may, means the practice is encouraged and/or optional.[188] [SAE AS6285]

mean camber line, see CAMBER LINE.

measurement accuracy, see ACCURACY.

measurement precision, see PRECISION.

measurement repeatability, see REPEATABILITY.

measurement reproducibility, see REPRODUCIBILITY.

melting point (mp), **1.** [chemistry] the temperature at which a solid starts to melt as the temperature is increased slowly. If the heat is gradually and uniformly supplied to a pure substance, the rise in temperature stops at the melting point until the melting process is complete. – Compare FREEZING POINT.[152] [Rennie]

METAR, acronym for Meteorological Aerodrome Report or Meteorological Terminal Air Report. A routine weather report issued usually at hourly to sub-hourly intervals that provides a description of the meteorological elements observed at an airport at a specific time. – See AUTOMATED SURFACE OBSERVING SYSTEM, AUTOMATED WEATHER OBSERVING SYSTEM.[112,142] [ICAO 9640, NOAA FMH-1]

METAR code, acronyms and abbreviations used in METAR and TAF weather reports.[56,142] [MANOBS, NOAA FMH-1]

METAR code UP, UP means unknown precipitation when observation is done by an automatic observing system. An UP observation typically occurs when the automated sensors cannot determine the type of precipitation that is occurring either because the sensor cannot detect that specific precipitation type, or there is a mix of precipitation types.[124] [Landolt 2025]

METAR descriptor, see DESCRIPTOR.

methanol, **1.** [chemistry] Chemical Abstract registry number 67-56-1, alternate names: methyl alcohol, wood spirit, wood alcohol; molecular formula CH_4O; mol wt 32.04, mp – 97.8 °C, bp 64.7 °C, flash point closed cup 12 °C, flammable. **2.** [aircraft in-flight ice protection] a FREEZING POINT DEPRESSANT used in the formulation for FREEZING POINT DEPRESSANT ICE PROTECTION SYSTEMs (WEEPING WING). **3.** methanol is never used as a freezing point depressant in ground aircraft deicing/anti-icing fluids because of its flammability.– Compare ETHANOL, ISOPROPANOL, ETHYLENE GLYCOL.[144] [Merck Index]

middle speed aircraft, 1. colloquial term for LARGE TURBOPROP AIRCRAFT as described in the AERODYNAMIC ACCEPTANCE TEST standard (AS5900). **2.** an aircraft category defined by each aircraft manufacturer based on specific aircraft performance. – Compare HIGH SPEED AIRCRAFT, LOW SPEED AIRCRAFT. See MIDDLE SPEED RAMP TEST.[183] [SAE AS5900]

middle speed ramp (MSR), see MIDDLE SPEED RAMP TEST.

middle speed ramp test, **1.** an AERODYNAMIC ACCEPTANCE TEST performed to simulate LARGE TURBOPROP AIRCRAFT takeoffs, with rotation speeds between 80 knots and 100 knots and a time from brake release to ROTATION SPEED between 16 seconds and 20 seconds. **2.** a test conducted at 46 m/s (90 knots), representing the LIFTOFF SPEED (Vlof), after an 18 second acceleration at 2.6 m/s^2. **3.** a test defined in AS5900. – See HIGH SPEED RAMP TEST, LOW SPEED RAMP TEST.[165,167,183] [SAE AMS1424, SAE AMS1428, SAE AS5900]

minimum control speed (V_{mc}), **1.** [aerodynamics] the aircraft speed at which it is possible to maintain control of the aircraft with one engine inoperative and maintain straight flight with a bank angle not more than 5 degrees and with l50 lb or less of rudder control force. **2.** [aerodynamics] the aircraft speed below which the force of the AILERONS or RUDDER can apply to the aircraft is not large enough to counteract asymmetrical thrust (with an inoperative engine) at maximum power. If an engine fails and the aircraft is at a speed below the minimum control speed, the pilot may not be able to maintain control of the aircraft. See TAKEOFF DECISION SPEED, ROTATION SPEED, MINIMUM UNSTICK SPEED, LIFTOFF SPEED, TAKEOFF SAFETY SPEED.[4,183,198] [14 CFR § 25.149, SAE AS5900, Shevell]

minimum detection angle, the minimum angle at which a REMOTE ON-GROUND ICE DETECTION SYSTEM sensor can directed and expected—without loss of functionality—to achieve the performance specified in AS5681.[182] [SAE AS5681]

minimum detection distance, the closest distance from its point of monitoring that a REMOTE ON-GROUND ICE DETECTION SYSTEM sensor can be while continuing to meet the performance specified in AS5681.[182] [SAE AS5681]

minimum unstick speed (V_{mu}), the lowest speed at which an aircraft can safely lift its nose wheel off the ground during takeoff, even with one engine inoperative. – See MINIMUM CONTROL SPEED, TAKEOFF DECISION SPEED, ROTATION SPEED, TAKEOFF SAFETY SPEED.[183,198] [SAE AS5900, Shevell]

miscible, [chemistry] describing liquids capable of mixing in any ratio without PHASE SEPARATION.[127] [Guide]

mist, **1.** [meteorology] a suspension of small water droplets of about 0.02 mm reducing visibility between 5/8 mile to 7 miles. **2.** [meteorology] an OBSCURATION with METAR CODE BR [French: bruine]. – See FREEZING MIST, FOG, FREEZING FOG.[56,142,219] [MANOBS, NOAA FMH-1, TSB]

mixed phase precipitation, [meteorology] the simultaneous occurrence of at least two precipitation types, with at least one type of precipitation occurring in liquid form and at least one type of precipitation occurring in solid form.

moderate, see INTENSITY QUALIFIER.

moderate drizzle, see DRIZZLE.

moderate freezing drizzle, see FREEZING DRIZZLE.

moderate freezing rain, see FREEZING RAIN.

moderate rain, see RAIN.

moderate snow, see SNOW.

moderate snow grains, see SNOW GRAINS.

moderate snow pellets, see SNOW PELLETS.

modifications approved by the purchaser, see WAIVER.

mole (mol)**,** an amount of substance that contains 6.02214976 x 10^{23} elementary entities where elementary entities may be atoms, molecules, ions, electrons or a specified group of particles. – See AVOGADRO'S NUMBER, MOLECULAR WEIGHT.[49] [Bureau]

molecular weight (mol wt), [chemistry] the sum of atomic weights (based on the weighted average atomic mass of naturally occurring isotopes) in a molecule expressed in grams per mole; *the molecular weight of ethylene glycol ($C_2H_6O_2$) is 62.07, the molecular weight of propylene glycol ($C_3H_8O_2$) is 76.10.* – See MOLE.[28,144] [Atkins, Merck Index]

monitored surface, the aircraft surface of concern regarding ice hazard.[182] [SAE AS5681]

mud wet, [runway contaminant] sticky, soft earth material.[83] [FAA AC 150-5200-30D]

multiple location qualification, **1.** [aircraft deicing fluid] process whereby the ORIGINAL MANUFACTURER (from its own manufacturing site or a SUBCONTRACTOR site) or a LICENSEE submits a sample for qualification for each production unit, at each site, prior to initial shipment from said site or production unit. **2.** [aircraft deicing fluid] multiple location qualifications are subject to either the initial qualification process or simplified qualification process (the simplified qualification process is almost always used). – See UNIT QUALIFICATION, SITE QUALIFICATION, INITIAL SHIPMENT. Compare INITIAL QUALIFICATION, PERIODIC REQUALIFICATION.[165,167] [SAE AMS1424, SAE AMS1428]

must, **1.** required. **2.** [aircraft deicing] mandatory term to convey the intent of meeting a regulatory requirement or other requirement, e.g., SAE STANDARD. – See IS/ARE REQUIRED, SHALL.[89,188,212] [FAA HOT, SAE AS6285, TC HOT]

NACA duct, [aircraft engine] a common form of low-drag air inlet design. When properly implemented, a NACA duct allows air to flow into an internal duct, often for cooling purposes, with a minimal disturbance to the flow. Synonyms: NACA SCOOP, NACA INLET.

NACA inlet, see NACA DUCT.

NACA scoop, see NACA DUCT.

nacelle, [aircraft components] a streamline enclosure or cowling that surrounds the aircraft engine.[85,198] [FAA H-8083-3C, Shevell]

natural snow, expression used to emphasize that snow was formed through natural processes in the atmosphere, as opposed to human-made artificial snow. – Compare ARTIFICIAL SNOW. See SNOW, SNOW TESTS.

NCAR snow machine, [aircraft deicing fluid testing] a machine developed at the National Center for Atmospheric Center (NCAR) to generate artificial snow by shaving deionized water ice cores. The ice cores are fed horizontally into a rotating drill bit at a controlled speed to achieve the desired PRECIPITATION RATE. The shaving drill bit blade rotation speed is also controlled, with faster rotational speeds producing smaller particle size distributions and slower rotational speeds

producing larger particle size distributions. The ice shaving mechanism is inside a two- to three-meter-high enclosure and uses linear translators to move the ice core/drill bit systems in horizontal patterns to evenly distribute the ice shavings over the test plate. The test plate is mounted on a mass BALANCE to measure the snowfall accumulation and control the precipitation rate through a computer program. – See SNOW TESTS, ARTIFICIAL SNOW, SNOW MACHINE. Compare AMIL SNOW MACHINE.[123,177] [Landolt, SAE ARP5945]

neat, **1.** free from dilution; *she likes her scotch neat*. **2.** [aircraft deicing] a neat Type II/III/IV fluid is as delivered by the fluid manufacturer, without added water by the user; *neat Type IV fluid*; *in the second step, the Type IV was applied neat*. **3.** [aircraft deicing] for Type II/III/IV, the numerical expression for neat is (100/0) meaning 100 parts of Type II/III/IV as delivered by the manufacturer and 0 parts water added by the user; *Type IV (100/0)*. **4.** the word *neat* is not used to describe Type I. **5.** since the publication of AS6285E in May 2023, the preferred word to express Type II/III/IV without water added by the user is the term undiluted. – Synonym: UNDILUTED. See TYPE II/III/IV NEAT, TYPE II/III/IV UNDILUTED, TYPE II/III/IV (100/0). Compare CONCENTRATE.[127,183] [Guide, SAE AS6285]

negative freezing point buffer, condition when the FREEZING POINT of a deicing/anti-icing fluid is above (warmer than) the OUTSIDE AIR TEMPERATURE.[188] [SAE AS6285]

new glycol, glycol from the glycol manufacturer that has not been used in any industrial application. – Compare RECYCLED GLYCOL.

newton, the SI unit of force (newton spelled without a capital; symbol N) being the force required to give a mass of one kilogram an acceleration of 1 m/s^2. Named after SIR ISAAC NEWTON.[49] [Bureau]

Newton, Sir Isaac, (1642-1727) English mathematician and physicist. He formulated Newton's law of gravitation and Newton's laws of motion, and made significant contributions to the field of fluid dynamics.[123,152] [Law, Rennie]

Newtonian fluid, **1.** a fluid whose viscosity remains unchanged when a shear force is applied. **2.** [aircraft deicing] characteristic of a Type I fluid. – See SHEAR FORCE. Compare NON-NEWTONIAN FLUID.[84,127,152,165] [FAA AC150-5300-14D, Guide, Rennie, SAE AMS1424]

nitrogen blanketing, see NITROGEN PADDING.

nitrogen padding, [chemical industry] a process by which nitrogen fills the vapor space of a vessel containing a liquid to reduce the risk of fire hazard or prevent OXIDATION; *nitrogen padding of uninhibited propylene glycol*. – Synonym: NITROGEN BLANKETING.[195] [Schaschke]

no direct spray areas, [aircraft deicing] aircraft areas that must not be sprayed directly with deicing/anti-icing fluids. *Generally, flightdeck windows, flightdeck windshield, cabin windows, cabin doors, pitot tubes, total air temperature probes, angle of attack vanes, other data sensing devices, static ports, aircraft intake or exhaust vents, ram air inlets, scoops, drains, outlets, pressurized outflow valves, aircraft wheels, brakes, oleo struts, switches, and hinge recesses or bushings of folding wing devices are considered no direct spray areas.* – Compare NO-SPRAY

AREAS, NO-SPRAY TYPE II, TYPE III, OR TYPE IV AREAS. See SPRAY NO-SPRAY DIAGRAM, SPRAY PATTERN.[164] [AIR8468]

no-spray areas, [aircraft deicing] aircraft areas that must not be sprayed with deicing/anti-icing fluids. *Generally, engine openings, engine exhausts, avionic vents, APU inlets, APU exhausts, and heat exchanger ventilation grids located on engine pylons are considered no-spray areas.* – Compare NO DIRECT SPRAY AREAS, NO-SPRAY TYPE II, TYPE III, OR TYPE IV AREAS. See SPRAY NO-SPRAY DIAGRAM, SPRAY PATTERN.[164] [AIR8468]

no-spray Type II, Type III, or Type IV areas, [aircraft deicing] aircraft areas that must not be sprayed directly with deicing/anti-icing fluids. *Generally, radomes are considered no-spray Type II, Type III, or Type IV areas.* – Compare NO-SPRAY AREAS, NO DIRECT SPRAY AREAS. See SPRAY NO-SPRAY DIAGRAM, SPRAY PATTERN.[164] [AIR8468]

nonconformance, failure of a product, process, or service to meet specified requirements or standards.[12] [ASQ Glossary]

nonconformity, **1.** [quality management] condition of not conforming to established requirements, specifications, or standards. Nonconformity may not necessarily result in immediate failures or defects but indicates a departure from the expected or prescribed norms. Nonconformities are identified through audits, inspections, or monitoring processes within a QUALITY MANAGEMENT SYSTEM. **2.** [aircraft deicing] SERVICE PROVIDERs and FLUID MANUFACTURERs are required to have procedures to deal with nonconformities, anomalies, discrepancies, and irregularities. **3.** nonconformities are classified by extent: local (e.g., several trucks with off spec fluid, limited (e.g., off spec fluid affecting an entire station), or systemic (e.g., off spec fluid system-wide). – Compare ANOMALY, DISCREPANCY, IRREGULARITY, SYSTEMIC NONCONFORMITY, LIMITED NONCONFORMITY, LOCAL NONFONFORMITY.[12,188,190] [ASQ Glossary, SAE AS6285, SAE AS6332]

nonenvironmental frost, see COLD-SOAKED FUEL FROST.[188] [SAE AS6285]

non-conventional glycol, see GLYCOL (NON-CONVENTIONAL).

non-glycol, [aircraft deicing fluids] all that is not glycol (conventional or non-conventional), such as organic salts, e.g., SODIUM FORMATE, SODIUM ACETATE, POTASSIUM FORMATE, POTASSIUM ACETATE, and any mixtures thereof. Mixtures of glycol (conventional and/or nonconventional) and non-glycol are defined as non-glycol. – Compare GLYCOL (CONVENTIONAL), GLYCOL (NON-CONVENTIONAL).[165,167] [SAE AMS1424, SAE AMS1428]

non-Newtonian fluid, **1.** a fluid whose viscosity changes when a SHEAR FORCE is applied (e.g., ketchup, wall paint, blood). **2.** characteristic of Type II/III/IV fluids. – Compare NEWTONIAN FLUID. See PSEUDOPLASTIC FLUID.[28,167,152,195,196] [Atkins, SAE AMS1428, Rennie, Schaschke, Schlichting]

non-standard dilution of Type II/III/IV fluid, a product/water ratio by volume other than 100/0, 72/25, or 50/50. – Compare STANDARD DILUTION OF TYPE II/III//IV.[127] [Guide]

nozzle, **1.** [aircraft deicing] a device used to control the flow and spray fluids (e.g., hot water, Type I/II/III/IV) onto aircraft surfaces to remove or prevent FROZEN CONTAMINATION. **2.** the spray pattern of a nozzle can be adjusted to produce a SOLID STREAM (straight stream), a SEMI-FAN SHAPE, or a full FAN SHAPE (wide stream). **3.** a device to control air flow (FORCED AIR) to dislodge frozen contamination from aircraft surfaces or assist in the application of fluids.[28,171,195] [Atkins, SAE ARP1971, Schaschke]

nozzle sample, **1.** a SAMPLE taken from a nozzle. **2.** [aircraft deicing fluids] Type II/III/IV are subject to SHEAR DEGRADATION caused by pumps and nozzles. To ensure compliance, nozzle samples are taken to verify that the viscosity is within the IN-SERVICE LIMITS. **3.** Type I nozzle samples are taken from DEICING VEHICLEs with PROPORTIONAL MIXING to verify the TYPE I CONCENTRATE/water ratio. **4.** nozzle samples are taken to verify the temperature of fluids. – Compare RETAINED SAMPLE. See SAMPLING GUIDELINE, SAMPLING PROCEDURE, LOWEST ON-WING VISCOSITY.[127] [Guide]

nucleation, **1.** [chemistry] the initiation of crystallization from solution, from liquid or vapor; the initiation can be from tiny solid particles (NUCLEUS), the surface of the container (e.g., the aircraft surface) **2.** [meteorology] the facilitation of PHASE TRANSITION of water vapor to liquid, or liquid water to ice, or water vapor directly to ice, often by tiny solid particles. – See SUPERCOOLED WATER.[44,74,219] [Britannica, Dunlop, TSB]

nucleation site, site where nucleation occurs. – See NUCLEATION**.**

nucleus, **1.** [chemistry] usually a solid or crystalline particle, or freshly exposed surface that facilitates PHASE TRANSITIONs such as liquid to solid (crystallization or freezing). **2.** [meteorology] usually tiny liquid or solid particles facilitating CONDENSATION (vapor to liquid), DEPOSITION (vapor to solid) or freezing (liquid water to ice). – Plural is nuclei. See NUCLEATION SITE.[74] [Dunlop]

numerical quantity value, [metrology] number in the expression quantity value, other than any number serving as the reference; *for the quantity value 5 °C, the numerical quantity value is **5**; for the quantity value 40,000 mPa·s, the numerical quantity value is **40,000**; for the quantity value 2.2 kg, the numerical quantity value is **2.2**–the same quantity value can be expressed as **2200** g in which case the numerical quantity value is **2200**; for the quantity value 510 m^2, the numerical quantity value is **510***, the measurement unit is m^2, *the number 2 serves as a reference and is not part of the numerical quantity value*. [French: valeur numérique]. – Synonyms: NUMERICAL VALUE OF A QUANTITY, NUMERICAL VALUE. – See QUANTITY VALUE.[116] [JCGM]

numerical value, [metrology] [French: valeur numérique] see NUMERICAL QUANTITY VALUE.

numerical value of quantity, [metrology] [French: valeur numérique d'une grandeur] see NUMERICAL QUANTITY VALUE.

obscuration, [meteorology] obstruction to vision (METAR CODE): mist (BR), fog (FG), smoke (FU), volcanic ash (VA), widespread dust (DU), sand (SA), haze (HZ), spray (PY). Potentially any precipitation type can also be considered an obscuring phenomena.[56,142] [MANOBS, NOAA FMH-1]

observation, [audit] a statement of fact made during an audit and substantiated by objective evidence. What the auditor observed whether positive or negative without implying the need for a CORRECTIVE ACTION. – Compare OPPORTUNITY FOR IMPROVEMENT.[190] [SAE AS6632]

off spec, **1.** an informal expression meaning that some or all the results of analysis fail to meet the requirements of the specification. **2.** short form for off specification. – Compare ON SPEC.[127] [Guide]

offseason, [aircraft deicing] predetermined period when deicing services require advance notice or are not readily available; *the offseason at Toronto Pearson Airport is May 01 to September 31*. – Compare DEICING SEASON.[101] [GTAA 2024]

oil, [runway contaminant] a viscous liquid derived from petroleum or synthetic material, especially for use as a fuel or lubricant.[83] [FAA AC 150-5300-30D]

on spec, **1.** an informal expression meaning that all the results of analysis are within the requirements of the specification. **2.** short form for on specification or within specification. – Compare OFF SPEC.[127] [Guide]

one-step anti-icing only, procedure carried out under the Transport Canada fluid application guidelines. The FAA and Transport Canada fluid application guidelines differ when it comes to one-step procedures. Compare ONE-STEP DEICING/ANTI-ICING, ONE-STEP DEICING ONLY. [89,112,212] [FAA HOT, ICAO 9640, TC HOT]

one-step deicing/anti-icing, **1.** procedure carried out with a heated fluid that remains on the aircraft surfaces to provide anti-icing capability. **2.** procedure which may be carried according to the FAA fluid application guidelines but not under Transport Canada fluid application guidelines. The FAA and Transport Canada fluid application guidelines differ when it comes to one-step procedures. Compare ONE-STEP ANTI-ICING ONLY, ONE-STEP DEICING ONLY. See TWO-STEP DEICING/ANTI-ICING.[89,112,212] [FAA HOT. ICAO 9640, TC HOT].

one-step deicing only, procedure carried out with a heated fluid under the Transport Canada fluid application guidelines. The FAA and Transport Canada fluid application guidelines differ when it comes to one-step procedures. – Compare ONE-STEP DEICING/ANTI-ICING, ONE-STEP ANTI-ICING ONLY. See TWO-STEP DEICING/ANTI-ICING.[89,112,212] [FAA HOT. ICAO 9640, TC HOT]

open basket deicing unit, aircraft ground deicing equipment, self-propelled or towable, equipped with a basket to perform aircraft deicing/anti-icing and associated CHECKs. – Colloquial synonym: OPEN BUCKET DEICING UNIT. Compare ENCLOSED CABIN DEICING UNIT.[150,224] [Polar, Vestergaard]

open bucket, See BASKET

open bucket deicing unit, see OPEN BASKET DEICING UNIT.

operational check, see FUNCTIONALITY CHECK.

operational ice, [aircraft engine icing] ice accumulated on FAN BLADES while the engine is running at idle (with the aircraft on the ground). Timely engine runups during taxi are considered a means

of operational ice removal. – Compare GROUND-ACCUMULATED ICE. See ENGINE BARREL ICING, ENGINE ICING, FAN BLADE ICING.[38] [Boeing 737-600 AMM].

operational property, **1.** [material science and engineering] characteristic of a material or system affecting operations. **2.** [aircraft deicing fluids] characteristic of a deicing anti-icing fluid to a) affect the application of the fluid (e.g., COLOR, BLEED-THROUGH, APPEARANCE, SUSPENDED MATTER, FOAM STABILITY, HARD WATER STABILITY, THERMAL STABILITY–ACCELERATED AGING, STORAGE STABILITY), or b) its EFFECT ON AIRCRAFT MATERIALS—also known as MATERIALS COMPATIBILITY—including SANDWICH CORROSION, TOTAL IMMERSION CORROSION, CORROSION OF LOW-EMBRITTLING CADMIUM PLATE, STRESS-CORROSION RESISTANCE, HYDROGEN EMBRITTLEMENT, EFFECT ON TRANSPARENT PLASTICS, EFFECT ON PAINTED SURFACES, EFFECT ON UNPAINTED SURFACES, SUCCESSIVE DRY-OUT AND REHYDRATION. – Compare PHYSICAL PROPERTY, PERFORMANCE PROPERTY, ENVIRONMENTAL PROPERTY. See FLUID PROPERTIES, SURROGATE.[165,167] [SAE AMS1424, SAE AMS1428]

operations bulletins, [Transport Canada] a method of formally advising employees of procedural changes or new information related to local deicing operations.[216] [TC TP 14052]

operations specifications (OpSpec), [FAA] the authorizations, limitations, and certain procedures under which each kind of operation, if applicable, is to be conducted.[2,6] [14 CFR § 1.2, 14 CFR § 119.7]

operator, **1.** [aircraft deicing] familiar term to designate someone who operates deicing equipment such as snow plow, snow sweeper. **2.** [Transport Canada] in respect of an aircraft, means the person that has possession of the aircraft as owner, lessee or otherwise.[216] [TC TP 14052]

operator certificate, **1.** [Transport Canada] a certificate issued under Canadian Aviation Regulations that authorizes the holder of the certificate to operate a commercial air service. **2.** short form for air operator certificate. – See AIR OPERATOR CERTIFICATE.[216] [TC TP 14052]

opportunity for improvement, [audit] suggested areas where the organization could enhance its processes, procedures, or practices to achieve better performance or compliance. An opportunity for improvement goes beyond mere observation. – Compare OBSERVATION.

optimizing adaptations, [safety science] deviations that are actioned to achieve a personal or organizational goal, including decisions that are in the person's or organization's perceived best interest. – See ADAPTATIONS.[219] [TSB]

original manufacturer, [aircraft deicing fluids, runway deicing products] the manufacturer who completes the first INITIAL QUALIFICATION for a given product. – Synonym: ORIGINAL VENDOR. Compare LICENSEE, SUBCONTRACTOR.[165,167,168,169] [SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435.

original vendor, see ORIGINAL MANUFACTURER.

outside air temperature (OAT), **1.** [aviation] the temperature of air around an aircraft, unaffected by the movement of the aircraft. **2.** [aircraft deicing] outside air temperature is an imperfect

SURROGATE for the aircraft skin temperature. – See STATIC AIR TEMPERATURE, COLD SOAKING, FUEL TEMPERATURE.

oxidation, **1.** [chemistry] a chemical reaction with oxygen. **2.** [inorganic chemistry] loss of electrons and an increase in oxidation number. **3.** [organic chemistry] the conversion of a functional group of an organic compound into a functional group with a higher oxidative state. *The ranking of the functional groups from a lower oxidation number to higher oxidation number is approximately as follows: alkane < alkene < alkyne < alcohol < glycol < aldehyde < carboxylic acid < carbon dioxide*; *example: ethane < ethylene < ethanol < ethylene glycol <acetaldehyde <glyoxal < glycolic acid < acetic acid < oxalic acid < carbon dioxide.* – See CATALYTIC OXIDATION.[131,152] [March, Rennie]

oxidation of carbon brakes, the reaction between carbon and oxygen resulting in the loss of mass.[160] [SAE AIR5490]

pad control, **1.** the actions to manage and supervise what happens on deicing bays to achieve the desired outcome **2.** call sign of the operating position that controls aircraft entering a DEICING FACILITY and exiting the DEICING BAYs.[175] [SAE ARP5660]

pad leadership, any positions of leadership at a DEICING FACILITY, such as the DEICING COORDINATOR.[175] [SAE ARP5660]

partial pressure, [chemistry, meteorology] the pressure that a component of a gaseous mixture would have if it alone occupied the same volume at the same temperature as the mixture.[11] [AMS Glossary]

pass-fail test, [deicing fluids, runway deicing products] a type of test where the outcome is binary—either it passes or fails. *Examples of such tests are flash point, pH, color, appearance, viscosity, shear stability, hard water stability, exposure to dry air, dry-out exposure to cold air, anti-icing performance, freezing point, fluid elimination, thermal stability-accelerated aging, sandwich corrosion, total immersion corrosion, corrosion of low-embrittling cadmium plate, hydrogen embrittlement, effect on transparent plastics, effect on painted surfaces, effect on unpainted surfaces, chloride content, runway concrete surface scaling resistance, etc.* – Compare DETERMINE AND REPORT TEST, MANDATORY INFORMATION, MANDATORY DOCUMENTATION.[132,165,167,168,169] [MW, SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435]

peak precipitation rates, [fluid testing] PRECIPITATION RATEs measured over a fixed period, usually by accumulating precipitation continuously and weighing at short intervals. The peak values are very sensitive to the length of the interval.[135] [Myers]

performance property, **1.** [material science and engineering] characteristic of a material or system to perform its intended function. **2.** [deicing fluids] characteristic of a deicing/anti-icing fluid related to deicing/anti-icing and aerodynamic performance; *examples of performance properties are high humidity endurance time, water spray endurance time, endurance time, high speed ramp lowest aerodynamic acceptance temperature, middle speed ramp lowest aerodynamic acceptance temperature, low speed ramp lowest aerodynamic acceptance temperature, elimination, temperature (for deicing), and freezing point*. **3.** [deicing fluids] a physical property

may be used as SURROGATE for performance properties (e.g., low shear rate viscosity for endurance time) or as a marker for composition (refraction for glycol/water ratio). – Compare PHYSICAL PROPERTY, OPERATIONAL PROPERTY, ENVIRONMENTAL PROPERTIES, MATERIALS COMPATIBILITY. See FLUID PROPERTIES.[165,167,173,177,183] [SAE AMS1424, SAE AMS1428, SAE ARP5485, SAE ARP5945, SAE AS5900]

periodic qualification, see PERIODIC REQUALIFICATION.

periodic requalification (PR), **1.** [aircraft deicing fluids, runway deicing products] the process of extending the aircraft deicing/anti-icing fluid or runway deicing product QUALIFICATION EXPIRY DATE by performing either an initial qualification or specified tests (usually less tests that an initial qualification) and for which the qualification test reports are issued. **2.** [aircraft deicing fluids and runway deicing products] periodic qualifications are performed approximately two years after initial qualification and approximately every four years thereafter. **3.** [aircraft deicing fluids] for Type I fluids the requalification tests are the ANTI-ICING PERFORMANCE test and the AERODYNAMIC ACCEPTANCE TEST(s); for Type II/III/IV fluids the periodic requalification tests are viscosity, anti-icing performance test, aerodynamic acceptance test(s). **4.** [runway deicing products] for solid runway deicing products the periodic requalification tests are: EFFECT ON TRANSPARENT PLASTICS, EFFECT ON PAINTED SURFACES, EFFECT ON UNPAINTED SURFACES, RUNWAY CONCRETE SCALING RESISTANCE, ASPHALT CONCRETE DEGRADATION RESISTANCE (for products used in Europe), and EFFECT ON AIRCRAFT MATERIALS; for liquid runway deicing products, the periodic requalification tests are the same as for the solid runway deicing products plus freezing point determination and RINSIBILITY. – See QUALIFICATION TEST REPORT., PERFORMANCE PROPERTY, OPERATIONAL PROPERTY, PHYSICAL PROPERTY, SURROGATE. Compare INITIAL QUALIFICATION, SITE QUALIFICATION.[165,167,168,169] [SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435]

performance specification a standard that establishes the expected results or capabilities of a product or system without dictating its exact composition. Instead of specifying ingredients or materials, it sets criteria such as effectiveness, efficiency, reliability or durability. This approach grants flexibility to the formulator in achieving performance goals, provided the final outcome meets the required standards. SAE AMS1424 and AMS1428 are examples of performance specifications. They define various performance properties such as aerodynamic acceptance, water spray endurance time, aerodynamic acceptance test, and freezing point; operational properties including effects on aircraft materials; and physical properties like pH, viscosity, and flash point, without specifying the exact components or their proportions for use as FREEZING POINT DEPRESSANTs, BUFFER, corrosion inhibitors, dyes, or THICKENERs (for thickened fluid). – Compare COMPOSITION-OF-MATTER SPECIFICATION. See PERFORMANCE PROPERTY.[165,167] [SAE AMS1424, SAE AMS1428]

pH, **1.** stands for potential of hydrogen. **2.** a scale to express the acidity of a solution. Strictly speaking it is meant to represent the activity of hydrogen ions (H^+) in solution. Since hydrogen ion activity cannot be measured, as an approximation, the pH of a solution is defined as the negative logarithm of the hydrogen ion concentration in mole per liter [H^+]:

$$pH = - \log [H^+]$$

A neutral solution is defined as one in which the hydrogen ion concentration at 25 °C is 10^{-7} mole per liter, thus the pH is 7. Acidic solutions at 25° C will have a higher concentration of hydrogen ions and thus a pH lower than 7. Basic (alkaline) solutions at 25° C will have a lower concentration

of hydrogen ions and thus a pH higher than 7. **3.** at temperatures other than 25 °C, a neutral solution will have a different hydrogen ion concentration, thus a different pH; in other words, pH is temperature dependent. **4.** the pH of aqueous solutions is normally measured using a GLASS ELECTRODE. The glass electrode is effective at measuring hydrogen ions in dilute aqueous solutions. When measuring pH in organic solvents (e.g., ethylene glycol or propylene glycol), the activity of the hydrogen ions and the glass electrode are affected, leading to shift in readings, longer response time and variable results. **5.** [aircraft deicing] pH measurement is part of the QUALIFICATION, SALES SPECIFICATION and IN-SERVICE LIMITS for Type I/II/III/IV fluids. **6.** [aircraft deicing fluids, runway deicing products] pH is a DETERMINE AND REPORT TEST for the INITIAL QUALIFICATION but thereafter the value measured in the initial qualification becomes a reference point and pH becomes a PASS-FAIL TEST. **7.** when aircraft deicing fluids are overheated for a long period, pH may go down due to the formation of organic acids caused by the oxidative degradation of glycols. **8**. the pH scale was introduced by Søren Sørensen in 1909.[152,153,165,167,168,169] [Rennie, Reynolds, SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435]

pH litmus paper, a simple means of measuring whether a solution is acidic or basic. It does not give a pH value. It is a general indicator. The use of litmus paper is not recommended for use with deicing anti-icing fluids. – Compare PH PAPER STRIP. See pH.[130] [Malesky]

pH paper strip, a means for measuring approximately PH. The use of pH paper strips is not recommended for use with deicing/anti-icing fluids. – Compare PH LITMUS PAPER. See GLASS ELECTRODE.[188] [AS6285]

phase, **1.** [thermodynamics] each chemically or physically distinct, homogenous and mechanically separable part of a system. The three fundamental phases of matter are solid, liquid and gas. *Example 1: a saturated aqueous solution of NaCl in a closed vessel has 3 phases, solid NaCl, aqueous solution of NaCl and water vapor. Example 2: ice in contact with water saturated air has 3 phases, solid H_2O, air saturated H_2O liquid, air saturated with water vapor. Example 3: air, one phase since all the components are miscible.* **2.** [meteorology] the state of aggregation of a substance, for example, solid, liquid or gas.[11,154] [AMA Glossary, Rock]

phase separation, [chemistry] the process by which a single phase (solid or liquid) separates into or more phases. – See PHASE.[114] [IUPAC]

phase transition, [chemistry] the change from one phase to another such as solid to liquid, solid to gas, liquid to gas, gas to a solid; *the deposition of water vapor in the air to make clear ice on a wing is a phase transition*. – Compare TRANSITION [aerodynamics]. See EXOTHERMIC, ENDOTHERMIC, NUCLEUS.[195] [Schaschke]

physical property, **1.** [chemistry] characteristic of matter that can be measured by a physical means without changing the chemical composition of the material being studied. **2.** [deicing fluids] characteristic of the composition or state of a deicing/anti-icing fluid such as SPECIFIC GRAVITY, REFRACTION, SURFACE TENSION, pH, LOW SHEAR RATE VISCOSITY, TEMPERATURE, and RHEOLOGICAL PROFILE. **3.** [deicing fluids] physical properties are used as surrogate for performance properties (e.g., low shear rate viscosity for endurance time) or as a marker for composition (refraction for glycol/water ratio). **4.** when a physical properties affects the operational ability of a fluid, it may be classified as operational property. – Compare

PERFORMANCE PROPERTY, OPERATIONAL PROPERTY, ENVIRONMENTAL PROPERTY. See SURROGATE, FLUID PROPERTIES.[33,165,167] [Bell, SAE AMS1424, SAE AMS1428]

pilot-in-command (PIC), the pilot that is responsible for the operation and safety of an aircraft during flight time. – See FLIGHT TIME.[216] [TC TP 14052]

pink snow, snow contaminated with aircraft deicing/anti-icing fluid.[175] [SAE ARP5660]

pitch, **1.** [aerodynamics] the rotation of an aircraft about its lateral axis. **2.** one of the three dimensions of aircraft movement, the others being ROLL and YAW. **3.** for a propeller, the blade angle as measured from the plane of rotation.[85] [FAA H-8083-3C]

plan continuation bias, [safety science] the tendency to continue with the original plan even when changing circumstances require a new plan; it is a form of CONFIRMATION BIAS. An example would be an airline pilot who unexpectedly encounters bad weather at the scheduled destination but decides to land anyway rather than divert to another location. Plan continuation bias appears to be particularly strong toward the end of the activity and has been theorized to result from the interaction of such factors as cognitive load, task demands, and social influences. – Synonym: CONTINUATION BIAS. See HINDSIGHT BIAS.[13,219] [APA, TSB]

planetary boundary layer, [meteorology] the layer of the atmosphere closest to the Earth's surface and subject to turbulence, friction effects, and surface heating, typically 500 meters over the oceans and 15000 meters over land. – Synonym: ATMOSPHERIC BOUNDARY LAYER. See BOUNDARY LAYER.[74] [Dunlop]

plate failure, usually the same as STANDARD PLATE FAILURE.[135] [Myers]

pneumatic boot, see DEICING BOOT.

point and shoot thermometer, colloquial name for INFRARED THERMOMETER.

positive hold, [deicing operations] all means to ensure that the aircraft will remain stationary (hold) and is configured for deicing to allow deicing crew and equipment to safely approach the aircraft until the deicing crew and equipment have gone to their safety zones away from the aircraft, the aircraft has received its final release, and is safe to move.[174] [SAE ARP5560]

postapplication check, see POSTDEICING/ANTI-ICING CHECK (the HARMONIZED TERM is postdeicing/anti-icing check).[82] [FAA AC 120-60B]

postdeicing check, **1.** [deicing operations] an external examination of the aircraft after deicing only to ensure that the aircraft was correctly deiced (no anti-icing, with or without forced air) and that there is no residual unallowed frozen contamination. – Compare POSTDEICING/ANTI-ICING CHECK.[82] [FAA AC 120-60B]

postdeicing/anti-icing check, [deicing operations] an external examination of the aircraft after deicing and/or anti-icing (with or without forced air) to ensure that the aircraft was correctly deiced and or anti-iced and that there is no residual unallowed frozen contamination. – Synonyms: POSTAPPLICATION CHECK, POST-TREATMENT CHECK (the HARMONIZED TERM is postdeicing/anti-

icing check). Compare POST DEICING CHECK, PREFLIGHT CONTAMINATION CHECK, PRETAKEOFF CONTAMINATION CHECK. See TACTILE CHECK.[75,76,82,163,182,188] [EASA EU Reg, EASA SIB 2008-29, FAA AC 120-60B, SAE AIR6284, SAE AS5681, SAE AS6285,]

postdeicing/anti-icing report, [deicing operations] a report given to the flightcrew confirming that deicing/anti-icing has been carried out, detailing of the deicing/anti-icing procedure that was applied (anti-icing code), and confirming completion of the POSTDEICING/ANTI-ICING CHECK was performed. – See ANTI-ICING CODE. – Compare POSTDEICING REPORT.[188] [SAE AS6285]

postdeicing report, report given to the flightcrew confirming that deicing (removal of contamination only) has been carried out and the details of the deicing only procedure that was applied and that no holdover time and no allowance time is applicable—as opposed to a postdeicing/anti-icing report when there is a holdover time or allowance time. – Compare POSTDEICING/ANTI-ICING REPORT.[188,189] [SAE AS6285, SAE AS6286]

post-treatment check, see POSTDEICING/ANTI-ICING CHECK (the HARMONIZED TERM is postdeicing/anti-icing check).

potassium acetate, **1.** [chemistry] Chemical Abstract registry number 127-08-2, alternate name: acetic acid potassium salt (1:1); molecular formula $C_2H_3KO_2$; molecular weight 98.14. **2.** [runway deicing products] a FREEZING POINT DEPRESSANT used in runway deicing products. – Compare POTASSIUM FORMATE, SODIUM ACETATE, SODIUM FORMATE.[144] [Merck Index]

potassium formate, **1.** [chemistry] Chemical Abstract registry number 590-29-4, alternate name: formic acid potassium salt (1:1); molecular formula $CHKO_2$; molecular weight 84.12. **2.** [runway deicing products] a FREEZING POINT DEPRESSANT used in runway deicing products. – Compare POTASSIUM ACETATE, SODIUM ACETATE, SODIUM FORMATE.[144] [Merck Index]

powered-lift, a heavier-than-air aircraft capable of vertical takeoff, vertical landing, and low speed flight that depends principally on engine-driven lift devices or engine thrust for lift during these flight regimes and on nonrotating airfoil(s) for lift during horizontal flight. – Compare ROTORCRAFT, HELICOPTER.[1] [14 CFR § 1.1]

pour point, [chemical industry] for substances that do not crystallize at all or not readily, the temperature at which they fail to flow and set up as a glass. – Compare FREEZING POINT.[127] [Guide]

pre/post deicing inspector, a person trained and qualified to verify for the presence or absence of contamination on an aircraft.[189] [SAE AS6286]

precipitation, **1.** [meteorology] all HYDROMETEORS formed in the atmosphere, consisting of liquid, solid, or a combination of the two (e.g., resulting from incomplete melting or freezing or from accretion), that are large enough to fall as a result of gravity. **2.** [meteorology] the amount, usually expressed in millimeters or inches of liquid water depth, of the water substance that has fallen at a given point over a specified period of time. As this is usually measured in a fixed rain gauge, small amounts of dew, frost, rime, etc., may be included in the total. The more common term rainfall is also used in this total sense to include not only amounts of rain, but also the water equivalents of frozen precipitation. **3.** [aircraft deicing] rate of any liquid, frozen or freezing

precipitation, falling or forming, including any wind-induced deposition, on aircraft or standard test plates. See PRECIPITATION RATE.[11,216] [AMS Glossary, TC TP14052]

precipitation discriminator, [meteorology] the sensor on an automated weather station that determines the type of precipitation that is occurring.

precipitation intensity, [meteorology] an indication of the amount of precipitation collected per unit time interval. It is expressed in METAR/SPECI with intensity qualifiers, light (-), moderate (no symbol) or heavy (+). Intensity is defined with respect to the type of precipitation occurring, based either on rate of fall for rain and ice pellets or visibility for snow, snow pellets, and drizzle. The rate of fall criterion is based on time and does not accurately describe the intensity at a particular time of observation. – See INTENSITY QUALIFIER, PRECIPITATION RATE.[112,142] [ICAO 9640, NOAA FMH-1]

precipitation rate, **1.** [meteorology] the rate at which precipitation is falling as measured quantitatively or estimated from visibility. **2.** [meteorology] amount of water, liquid or solid, that reaches the ground in a specified period, normally expressed as liquid water in mm/h. **3.** [aircraft deicing] rate of any liquid, frozen or freezing precipitation, falling or forming, including any wind-induced deposition, on aircraft or standard test plates, expressed in $g/dm^2/h$. **4.** precipitation rate in mm/h can be converted to $g/dm^2/h$ by multiplying by a factor of ten, e.g., 5 mm/h = 50 $g/dm^2/h$. – See PRECIPITATION INTENSITY, SNOWFALL VISIBILITY TABLE.[142,216] [NOAA FMH-1, TC TP 14052]

precision, [chemistry, engineering, metrology] closeness of agreement between measured quantity values obtained by replicate measurements on the same or similar objects under specified conditions—the reproducibility of a measurement under unchanged conditions. Precision measures how close observations are to each other. Precision is usually expressed numerically by standard deviation, variance or coefficient of variation. Precision is used to define REPEATABILITY and REPRODUCIBILITY. – Synonym: MEASUREMENT PRECISION [French: fidélité, fidélité de mesure]. Compare ACCURACY.[28,33,116] [Atkins, Bell, JCGM]

predeicing check, see PREFLIGHT CONTAMINATION CHECK (the HARMONIZED TERM is preflight contamination check).

predeicing process, a process to remove large quantities of frozen contamination (e.g., with FORCED AIR, hot water) prior to the regular deicing/anti-icing process with the objective of reducing the quantity of deicing fluid to be used.[163,188] [SAE AIR6284, SAE AS6285]

preflight contamination check, a CHECK performed by the FLIGHTCREW or GROUNDCREW prior to departure to verify the presence of FROZEN CONTAMINATION in order to establish the need for deicing/anti-icing. It may be part of the flightcrew walk-around before the flight. – Synonyms: PREDEICING CHECK, CONTAMINATION CHECK (the HARMONIZED TERM is preflight contamination check). Compare POSTDEICING/ANTI-ICING CHECK, PRETAKEOFF CHECK, PRETAKEOFF CONTAMINATION CHECK.[182,188,189] [SAE AS5681, SAE AS6285, SAE AS6286]

pretakeoff check, a check by the flightcrew prior to takeoff and within holdover time. This check is normally conducted from inside the flightdeck. It is normally accompanied by a continuous assessment of the conditions that affect holdover time and includes an assessment and adjustment

of holdover time. – Compare PRETAKEOFF CONTAMINATION CHECK.[75,76,82,188] [EASA EU Reg, EASA SIB 2008-29, FAA AC 120-60B, SAE AS6285]

pretakeoff contamination check, **1.** a check of the critical surfaces for adhering contamination accomplished after the HOLDOVER TIME has been exceeded and that must be completed within five minutes of the beginning of takeoff. **2.** [FAA] a check (conducted after the aircraft's holdover time has been exceeded) to ensure the aircraft's wings, control surfaces, and other CRITICAL SURFACEs, as defined in the certificate holder's program, are free of all frozen contaminants. This check must be completed within 5 minutes before beginning takeoff and from outside the aircraft, unless the certificate holder's FAA-approved program specifies otherwise. **3.** [Transport Canada] see PRETAKEOFF CONTAMINATION INSPECTION. – Compare POST DEICING/ANTI-ICING CHECK, PRETAKEOFF CHECK, [75,76,82,188,216] [EASA EU Reg, EASA SIB 2008-29, FAA AC 120-60B, SAE AS6285, TC TP 14052].

pretakeoff contamination inspection, [Transport Canada] an inspection, mandatory under certain circumstances, conducted by a qualified person, immediately prior to takeoff, to determine if the aircraft CRITICAL SURFACEs are contaminated by frost, ice, slush or snow. – The HARMONIZED TERM is PRETAKEOFF CONTAMINATION CHECK.[214,216] [TC 622.11, TC TP 14052]

pretakeoff contamination report, [Transport Canada] report that must be made to the PILOT-IN-COMMAND following the PRETAKEOFF CONTAMINATION INSPECTION describing how the inspection was conducted. The report must also confirm that all critical surfaces are free of CONTAMINATION for the takeoff to occur.[216] [TC TP 14052]

preventive action, a proactive process focusing on negative trends that attempts to stop a potential problem from occurring or from becoming too severe.[190] [SAE AS6332]

previous load, **1.** [logistics] the content of a bulk container immediately before the current load. **2.** [logistics] in day-to-day use, the terms *prior load* and *previous load* may be used interchangeably. **3.** [chemical industry] chemical manufacturers may have a list of forbidden prior and previous loads. – See PRIOR LOAD, WASH CERTIFICATE.

primary wave, [fluid behavior subjected to aerodynamic forces] term to describe the initial flow of fluid that occurs as the aircraft accelerates for its takeoff run. – See FLOWOFF, SECONDARY WAVE.[45,117,158] [Broeren, Koivisto, Runyan]

prior load, **1.** [logistics] the content of a bulk container before its current content, not necessarily the load immediately before the current load. **2.** [logistics] in day-to-day use, the terms *prior load* and *previous load* may be used interchangeably. **3.** [chemical industry] chemical manufacturers may have a list of forbidden prior load contents seeking to avoid product incompatibilities. – See WASH CERTIFICATE, PREVIOUS LOAD.[127] [Guide]

pristine fluid, [endurance time testing] fluid that is entirely uncontaminated by frozen or liquid precipitation (the expression pristine fluid does not imply on spec or off spec). – Compare ON SPEC, OFF SPEC.[135] [Myers]

probes attached to the strut, [aircraft engine] various sensors or probes attached to the STRUT, which is a supporting structure that connects the engine to the WING or FUSELAGE. These probes

can include instruments for measuring TEMPERATURE, pressure, or airflow. These probes are susceptible to icing.

production batch, 1. [manufacturing] a large scale specific quantity of goods or materials produced during a single manufacturing process or production run on an industrial scale for commercial manufacturing. It represents a distinct unit of production, typically grouped together for consistency in quality, materials, and processes. **2.** a production batch shares the same production conditions, raw materials, equipment setting and production dates. **3.** the focus of a production batch is efficiency, consistency and output. **4.** [aircraft deicing fluids] for Type I/II/III/IV fluids each production unit or site (where production batches are made) must receive a UNIT QUALIFICATION or SITE QUALIFICATION (as the case may be). – Compare PRODUCTION LOT, LABORATORY BATCH. See BATCH, LOT.[165,167] [SAE AMS1424, SAE AMS1428]

production limits, [aircraft deicing fluids] operational boundaries and quality controls manufacturers follow when producing deicing fluid; normally production limits remain confidential with the fluid manufacturers who will normally set their production limits narrower their SALES SPECIFICATIONs.

production lot, a production lot may consist of several production batches. Compare PRODUCTION BATCH. See BATCH, LOT, LOT ACCEPTANCE TESTS.

production unit qualification, see UNIT QUALIFICATION.

program manager, [aircraft deicing] the person responsible for ensuring that the process needed to maintain the quality of systems necessary to deliver the CLEAN AIRCRAFT CONCEPT during winter operations is established and maintained. – Synonyms: WINTER PROGRAM MANAGER, RESPONSIBLE PERSON, ACCOUNTABLE EXECUTIVE, ACCOUNTABLE PERSON.[189,190] [SAE AS6286, SAE AS6332]

propeller contamination, see PROPELLER ICING.

propeller electrothermal ice protection system, an ICE PROTECTION SYSTEM that cycles much like DEICING BOOTs but generally by heating the first third of the propeller blade. The aim is to break the bond between the ice from the hub to about the first third of the blade and allow centrifugal forces to shed the ice for the remaining blade length.[80,105,110] [FAA AC 91-74B, Hartzell, Horrigan 2025]

propeller icing, accumulation of frozen precipitation on a propeller; *propeller icing disrupts the airflow over the propeller blades, reducing their efficiency and potentially causing vibrations*. **2.** propeller icing may pose safety hazards to personnel on the ground as dislodged ice could contact personnel or damage the fuselage. – Synonym: PROPELLER CONTAMINATION. See GROUND ICING, IN-FLIGHT ICING, ICE PROTECTION SYSTEM, HOTEL MODE, ENGINE ICING, ROTOR ICING, PROPELLER ELECTROTHERMAL ICE PROTECTION SYSTEM, FREEZING POINT DEPRESSANT ICE PROTECTION SYSTEM.

proportional mixing, 1. [aircraft deicing] the process of blending deicing fluid with water in precise ratios to achieve the desired FREEZING POINT. **2.** [aircraft deicing units] proportional mixing blending system (also called IN-TRUCK PROPORTIONAL MIXING) installed on deicing units that

adjusts the freezing point of aircraft deicing fluids based on the OUTSIDE AIR TEMPERATURE (OAT) and the FREEZING POINT BUFFER, or at a set freezing point defined by the SERVICE PROVIDER.

propylene glycol, **1.** [chemistry] Chemical Abstract registry number 57-55-6, alternate names: 1,2-propanediol, PG, MPG; molecular formula $C_3H_8O_2$; molecular weight 76.10. **2.** [aircraft deicing] a FREEZING POINT DEPRESSANT used in the formulation of aircraft deicing/anti-icing fluids. – Compare ETHYLENE GLYCOL.[144] [Merck Index]

protection time, the period that an anti-icing treatment protects aerodynamically critical surfaces from the adhesion of contamination and the resulting roughness that could cause a premature stall or result in loss of control and prevent the crew from safely operating the aircraft. – Compare HOLDOVER TIME.[135] [Myers]

proximity sensor, **1.** [deicing unit] a safety feature on deicing unit that, upon activation, disengages relevant systems, preventing damage from physical contact between the deicing unit components (e.g., spray nozzle, FORCED AIR nozzle, operator BASKET) and aircraft surfaces. **2.** when a proximity sensor is activated it is commonly referred to as a TUSK OUT which requires communications between the flightcrew and groundcrew.[100,188] [GTAA 2022, SAE AS6285]

pseudoplastic fluid, **1.** a fluid whose VISCOSITY decreases when a SHEAR FORCE is applied. **2**. a characteristic of Type II/III/IV fluids. – Synonym: SHEAR THINNING FLUID. See NON-NEWTONIAN FLUID.[127,167] [Atkins, SAE AMS1428]

purchaser, **1.** [business] the organization or person who buys something. **2.** [aircraft deicing fluids, runway deicing products] term used in AMS1424, AMS1428, AMS1431 and AMS1435 for an organization buying aircraft deicing fluids or runway deicing products from a VENDOR. Typically, the purchaser is an airline, a SERVICE PROVIDER, or an airport. – See REJECTION, WAIVER.[53,165,167,168,169] [Cambridge, SAE AMS1424, SAE AMS1428, AMS1431, SAE AMS1435]

pylon, [aircraft engine] a structural component that connects an aircraft engine to the WING or FUSELAGE. It provides a mounting point for the engine, as well as a means of transferring the engine thrust to the AIRFRAME.[198] [Shevell]

qualification, **1.** the process of ensuring that a person, system, product or process meets certain standards or requirements. **2.** a condition that must be met before the authorization is granted to enter a certain group or perform certain tasks. – Compare CERTIFICATION. See INITIAL QUALIFICATION, MULTIPLE LOCATION QUALIFICATION, PERIODIC REQUALIFICATION, QUALIFICATION TEST REPORT.[99,189] [Gorse, SAE AS6286]

qualification expiry date, **1.** for Type I/II/III/IV fluids, the earlier of expiry dates of either the qualification test reports for the AERODYNAMIC ACCEPTANCE TEST(s) or the ANTI-ICING PERFORMANCE (WATER SPRAY ENDURANCE TEST and HIGH HUMIDITY ENDURANCE TEST). **2.** qualification expiry dates can be found on the AMIL web site and in the FAA/Transport Canada list of fluids in the *Holdover Time Guidelines*. – Compare SHELF LIFE.[89,127,212] [FAA HOT, Guide, TC HOT]

qualification test report, **1.** a qualification test report issued for an INITIAL QUALIFICATION, PERIODIC REQUALIFICATION, SITE QUALIFICATION, or PRODUCTION UNIT QUALIFICATION. **2.** a report

usually issued by the Anti-Icing Materials Laboratory (AMIL) for either the AERODYNAMIC ACCEPTANCE TEST(s) and ANTI-ICING PERFORMANCE (WATER SPRAY ENDURANCE TEST and HIGH HUMIDITY ENDURANCE TEST). **3.** a report usually issued by SMI for MATERIALS COMPATIBILITY. – See QUALIFICATION.[89,165,167,212] [FAA HOT, SAE AMS1424, SAE AMS1428, TC HOT]

qualified, having complied with certain standards or requirements. See QUALIFIED FLUID, QUALIFIED RUNWAY DEICING PRODUCT. – Compare CERTIFIED.

qualified fluid, **1.** [aircraft deicing] a fluid that fulfills the requirements of AMS1424 for Type I or AMS1428 for Type II/III/IV. **2.** a fluid qualified to be on the fluid list of the FAA/Transport Canada *Holdover Time Guidelines*, that is a fluid with currently valid qualification test reports for the AERODYNAMIC ACCEPTANCE TEST(s) and ANTI-ICING PERFORMANCE (WATER SPRAY ENDURANCE TEST and HIGH HUMIDITY ENDURANCE TEST) and that has been tested for ENDURANCE TIME.[89,179,212] [FAA HOT, SAE ARP6852, TC HOT]

qualified personnel, [aircraft deicing] persons that have successfully completed theoretical and/or practical training requirements, including examinations.[190] [SAE AS6332]

qualified runway deicing product, a product that fulfills the requirements of AMS1431 or AMS1435.[168,169] [SAE AMS1431, SAE AMS1435]

qualified staff, see QUALIFIED PERSONNEL.

quality assurance (QA), **1.** the part of quality management focused on providing confidence that quality requirements will be fulfilled; the confidence provided by quality assurance is twofold—internally to management and externally to customers, government agencies, regulators, certifiers, and third parties. **2.** all the planned and systematic activities implemented within the quality system that can be demonstrated to provide confidence that a product or service will fulfill requirements for quality. **3.** a proactive process focused on preventing quality issues. **4.** a subset of QUALITY MANAGEMENT SYSTEM. **5.** a superset of QUALITY CONTROL.[12,190,195] [ASQ, SAE AS6332, Schaschke]

quality control (QC), **1.** part of quality management focused on fulfilling quality requirements. **2.** set of planned procedures or system activities used to ensure that products (e.g., fluid) or results from a process (e.g., deicing) or a service meet a defined set of requirements, involving sampling, inspections and testing. **3.** a subset of QUALITY ASSURANCE and of QUALITY MANAGEMENT SYSTEM.[188,190,195] [SAE AS6285, SAE AS6332, Schaschke]

quality improvement, the actions taken throughout an organization to increase the effectiveness of activities and processes to provide added benefits to both the organization and its customers.[190] [SAE AS6332]

quality management system (QMS), **1.** a formalized system that documents processes, procedures, and responsibilities for achieving quality policies and objectives. A quality management system helps coordinate and direct an organization's activities to meet customer and regulatory requirements and improve its effectiveness and efficiency on a continuous basis. **2.** quality management ensures that an organization, product, or service is consistent. It has four main components, quality planning, quality assurance, quality control and quality improvement. Quality

management is focused not only on product and service quality, but also on the means to achieve it. Quality management, therefore, uses quality assurance and control of processes as well as products to achieve more consistent quality. **3.** a formal system that includes quality assurance and quality control. – Compare SAFETY MANAGEMENT SYSTEM. See QUALITY ASSURANCE, QUALITY CONTROL.[12,189,190][ASQ, SAE AS6286, SAE AS6332]

quality manual, the central document that brings together all the aspects necessary to demonstrate control, conformance and continual improvement over aircraft deicing and anti-icing. The contents of a quality manual may be included as part of a GROUND DEICING PROGRAM.[190] [SAE AS6332]

quantity value, number and reference together expressing magnitude of quantity; *length of an aircraft* **76.3 m**, *aerodynamic acceptance temperature* **-30 °C**, *viscosity of a sample* **47,800 mPa·s**, *water spray endurance time* **80 minutes**, *refraction* **32°Brix**, refractive index **1.3200** (the measurement unit is generally not indicated for dimensionless quantities, such as ratios of two quantities of the same kind). [French: valeur d'une grandeur]. – Synonyms: VALUE OF A QUANTITY, VALUE, DIMENSIONLESS QUANTITY. Compare NUMERICAL QUANTITY VALUE.[116] [JCGM]

quasi-stationary front, see STALLED FRONT.

radiation fog, [meteorology] fog produced over a land area when RADIATIONAL COOLING reduces the air temperature below the DEWPOINT.[11,74] [AMS Glossary, Dunlop]

radiational cooling, **1.** [meteorology] cooling of the ground or objects by emitting infrared radiation to space, particularly on cloudless nights. **2.** [aircraft deicing] a process involved in FROST formation. – See ACTIVE FROST, FROST FORMATION CHART, EMISSIVITY.[11,74] [AMS Glossary, Dunlop]

rain, **1.** [meteorology] precipitation of liquid water particles, either in the form of drops of more than 0.5 mm in diameter or smaller drops which, in contrast to DRIZZLE, are widely separated. **2.** [meteorology] rain intensities are defined as light (-RA) (a rate of fall from a trace to 2.5 mm (0.1 in.) h^{-1}), moderate (RA) (a rate of fall of 2.5–7.5 mm (0.11–0.3 in.) h^{-1}), and heavy (+RA) (a rate of fall greater than 7.5 mm (0.3 in.) h^{-1}).[112,142] [ICAO 9640, NOAA FMH-1]

rain and snow, precipitation in the form of a mixture of rain and snow. – See MIXED PHASE PRECIPITATION.[203] [SIAGDP]

rain on cold-soaked surface, the laboratory endurance time precipitation condition to simulate rain on cold-soaked wing is variously called *rain on cold-soaked surface* (because it is performed on a plate) or simply *rain on cold-soaked wing* (the expression used in the FAA/Transport Canada *Holdover Time Guidelines* is rain on cold soaked wing). – See RAIN ON COLD-SOAKED WING.

rain on cold-soaked wing, **1.** a holdover time precipitation condition for OUTSIDE AIR TEMPERATURE above 0 °C. **2.** [endurance time testing] precipitation with a PRECIPITATION RATE of 5–75 g/dm^2/h, a range encompassing DRIZZLE (5–13 g/dm^2/h), LIGHT RAIN (13–25 g/dm^2/h), and MODERATE RAIN (25–75 g/dm^2/h).[34,89,173,203,212] [Bendickson, FAA HOT, SAE AS5485, SIAGDP, TC HOT]

ram rise (RR), **1.** [in-flight parameters] the increase in air temperature caused by compression (ADIABATIC increase in temperature) and friction (kinetic heating) of air at high velocities. This occurs when an aircraft moves at high speed. **2.** ram rise equals the TOTAL AIR TEMPERATURE minus STATIC AIR TEMPERATURE.[86] [FAA H-8083-31B]

rate of fall, [meteorology] see PRECIPITATION RATE.[56,142] [MANOBS, NOAA FMH-1]

rationale, [SAE documentation] a section that must appear in SAE STANDARDs defining the need for developing a standard, the factor(s) which prompt a revision of a document, or the reason for any changes that may have occurred in the document. It appears as an unnumbered section before any front matter such as a foreword, table of content or scope.[193] [SAE Style Manual]

ready-to-use Type I, a Type I fluid as sold by the fluid manufacturer that does not require to be diluted. – Synonym: TYPE I READY-TO-USE. Compare CONCENTRATE.

rear-mounted engine, [aircraft structure] an engine mounted at the rear of the fuselage *for example, the MD-11 has one rear-mounted engine (and two wing-mounted engines), the Bombardier (now Mitsubishi) CRJ and Embraer ERJ aircraft have two rear-mounted engines*. – Synonym: AFT-MOUNTED ENGINE.

receding contact angle, **1.** [surface chemistry] a measurement of dewetting behavior. **2.** the angle formed by a liquid and a solid which has already been wetted by the liquid and which is in the process of being dewetted as it recedes (retracts) out on a surface. **3.** receding contact angle is influenced by factors such as surface chemistry (hydrophilicity, hydrophobicity), contamination on the surface, SURFACE TENSION, and roughness. – See CONTACT ANGLE, CONTACT LINE, WETTING.[162] [SAE AIR6232]

recycled glycol, **1.** [aircraft deicing] typically ETHYLENE GLYCOL or PROPYLENE GLYCOL recovered from SPENT DEICING FLUID that has been subjected to filtration, water evaporation, fractional distillation and decolorization to remove contaminants and achieve the desired purity. **2.** [aircraft deicing] the fluid manufacturer must report a) the presence of recycled glycol and b) whether the recycled glycol is from an airport, from a non-airport, or a mixture of both. – Compare NEW GLYCOL. See RECYCLED TYPE I.[165] [SAE AMS1424]

recycled Type I, **1.** a fluid fulfilling the requirements of AMS1424 made from either recycled ethylene glycol or recycled propylene glycol, but not both at the same time. **2.** the fluid manufacturer has the obligation to inform fluid users of a) the presence of recycled glycol and b) whether the recycled glycol is from an airport, from a non-airport, or a mixture of both. – See RECYCLED GLYCOL.[165] [SAE AMS1424]

refraction, **1.** the bending of light as it passes from one transparent substance into another. **2.** for SOLUTIONs, the refraction varies upon the concentration of the SOLUTE in the SOLVENT. Using a calibration curve, it is possible to determine the concentration of the solute in the solvent. For example, for aqueous glycol solutions, it is possible to determine the concentration of the glycol in water by measuring refraction with a refractometer and comparing the result to the CALIBRATION CURVE. **3.** refraction can be expressed as a dimensionless quantity (index of refraction) or as a scale of concentration, e.g., degrees Brix (°Brix), or freezing point (°C or °F). **4.** [aircraft deicing] a measurement to determine the concentration of glycol in a deicing fluid, and thus its freezing point.

5. a temperature sensitive measurement requiring carefully controlled temperature in the laboratory for the best ACCURACY. **6.** [aircraft deicing fluids] a SURROGATE for FREEZING POINT. – See BRIX, REFRACTIVE INDEX, REFRACTOMETER, DIMENSIONLESS QUANTITY.[33,127,188] [Bell, Guide, SAE AS6285]

refractive index, **1.** unit of measurement of refraction expressed in the form of a dimensionless number which is the ratio of the speed of light in vacuum over the speed of light in the substance. **2.** a dimensionless number greater than 1.000 since the speed of light in the substance will be greater than the speed of light in vacuum. **3.** [aircraft deicing] a unit of measurement of refraction calibrated to the glycol concentration or freezing point of a deicing fluid. **4.** [aircraft deicing fluids] a SURROGATE for FREEZING POINT. – Synonym: INDEX OF REFRACTION. See REFRACTION, DIMENSIONLESS QUANTITY.[33,127,188] [Bell, Guide, SAE AS6285]

refractometer, **1.** an optical instrument used to measure REFRACTION. **2.** an instrument whose result of measurement can be expressed as a dimensionless number (index of refraction) or as a scale of concentration, e.g., degree BRIX (°Brix), or freezing point (°C or °F). **3.** a laboratory instrument, field portable instrument or fixed inline instrument. **4.** a laboratory instrument (e.g., Abbé refractometer) with carefully controlled temperature for the greatest ACCURACY and PRECISION. **5.** a portable field instrument, analog or digital, with or without temperature compensation. **6.** [aircraft deicing] an inline instrument to measure concentration in blending systems. – See LABORATORY INSTRUMENT, FIELD INSTRUMENT.[127,188] [Guide, SAE AS6285]

regulator, an organization authorized to supervise, manage and enforce rules and standards within a specific sector or industry; *the FAA, CAAC, CAB, EASA, and Transport Canada are the respective regulators for civil aviation in the United States, China, Japan, Europe, and Canada*.

regression analysis, **1.** a set of statistical methods utilized to estimate the relationship between dependent and/or independent variables. **2.** a statistical procedure to find the best fit between a dependent variable and one or more independent variables so their relationship can be expressed as a mathematical model; *the general form of the regression equation holdover time in snow is* $t = 10^{I} R^{A} (2\text{-}T)^{B}$ *where t is the holdover time, R the rate of precipitation, T the temperature, I, A, and B are coefficients determined from the regression.* **3.** [aircraft deicing] regression analysis of ENDURANCE TIMEs used to estimate the relationship between fluid VISUAL FAILURE, air temperature, precipitation condition and rate, and whose final output is HOLDOVER TIME.[81,208] [FAA AC 120-112, TC AC 700-061]

rejection, [SAE Aerospace Material Specifications] the process of refusing or not accepting product that fails to the specification or modifications authorized by the PURCHASER.– See WAIVER.[165,163,167,168,169] [SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435]

relative humidity (RH), **1.** the ratio of the existing amount of water vapor in the air at a given temperature to the maximum amount that could exist at that temperature (expressed in percentage). **2.** [meteorology] the ratio of the vapor pressure to the SATURATION vapor pressure with respect to water (expressed in percentage).[195] [Schaschke]

relative wind, direction and speed experienced by an object moving through air. For an aircraft in flight, relative wind flows in a direction parallel with and opposite to the direction of flight.[85] [FAA H-8083-3C]

remote deicing facility, a deicing facility for single or multiple aircraft located away from the terminal or other area where aircraft loading activities normally take place.[172,175] [SAE ARP4902, SAE ARP5660]

remote on-ground ice detection system (ROGIDS), a system or device that makes a remote measurement of a monitored surface to determine whether frozen contamination is present. One of the intended functions of remote on-ground detection systems is the detection of CLEAR ICE.[182] [SAE AS5681]

remote on-ground ice detection system false negative, an indication of the absence of frozen contamination when frozen contamination is present on the reference surface.[182] [SAE AS5681]

remote on-ground ice detection system false positive, an indication of the presence of frozen contamination when no frozen contamination is present on the reference surface.[182] [SAE AS5681]

repeatability, [chemistry, engineering, metrology] the precision of replicate measurements on the same or similar object over a short period of time under a set of conditions that includes the same measurement procedure, same operators, same measuring system, same operating conditions, and same location. [French: répétabilité.] – Synonym: MEASUREMENT REPEATABILITY. Compare REPRODUCIBILITY. See PRECISION.[33,116,195] [Bell, JCGM, Schaschke]

representative sample, a sample intended to be representative of the larger quantity. – See SAMPLE.[127,195] [Guide, Schaschke]

representative surface, **1.** a portion of the aircraft that can be readily and clearly observed by the flightcrew from inside the aircraft and is used to judge whether or not critical surfaces have become contaminated. **2.** a representative surface if used for general situational awareness by the flightcrew need not be approved by the regulator—if used for decision making it needs to be approved by the regulator based on recommendation by the aircraft manufacturer. – See SITUATIONAL AWARENESS.[88,216] [FAA General Info, TC TP 14052]

reproducibility, [chemistry, engineering, metrology] the precision of replicate measurements on the same or similar object under a set of conditions that includes different operators, measuring systems, and locations. [French: reproductibilité]. – Synonym: MEASUREMENT REPRODUCIBILITY. Compare REPEATABILITY. See PRECISION.[116,195] [JCGM, Schaschke]

requalification, [aircraft deicing fluids and runway deicing products] see PERIODIC REQUALIFICATION.

residual fluid, **1.** Type I/II/III/IV fluid that is left on the aircraft during or after flight, usually on aerodynamically quiet surfaces, and generally considered a normal occurrence. **2.** fluid remaining on the lower plate of the wind tunnel test section after an AERODYNAMIC ACCEPTANCE TEST run. The average thickness of the residual fluid is used to compute the FLUID ELIMINATION. **3.** the fluid remaining after each aerodynamic acceptance test run is tested for water content and compared to

the fluid before the test run. **4.** fluid remaining on the wing or wing test section after a test run in the determination of ALLOWANCE TIMEs. – See AERODYNAMICALLY QUIET SURFACE. Compare FLUID RESIDUE.[127,156,183] [GUIDE, RUGGI 2009, SAE AS5900]

residue, see FLUID RESIDUE. – Compare RESIDUAL FLUID.

residual ice, [in-flight ice protection] ice remaining immediately after an actuation cycle of an IN-FLIGHT DEICING ICE PROTECTION SYSTEM. – Compare INTERCYCLE ICE, RUNBACK ICE.[174] [SAE ARP5624]

responsible person, see PROGRAM MANAGER.

retained sample, [chemical industry] a SAMPLE kept under ideal storage conditions for an eventual further verification of product quality.[127] [Guide]

revision date, [SAE] see SAE STANDARD.

Reynolds number, a DIMENSIONLESS QUANTITY representing the ratio of inertial forces to viscous forces for a given flow. Mathematically the Reynolds number is calculated as a characteristic length multiplied by a characteristic speed divided by viscosity. The magnitude of the Reynolds number is often related to transition to turbulence and boundary-layer SEPARATION. – See LAMINAR FLOW, TURBULENT FLOW, TRANSITION.[198] [Shevell]

rheology, the science of deformation and flow of matter. – See RHEOMETER, VISCOMETER.[31] [Barnes]

rheological profile, [aircraft anti-icing fluid rheology] name given to viscosity vs shear stress curves of a thickened anti-icing fluid produced with a rotational RHEOMETER. Rheological profiles of a thickened anti-icing fluid have been correlated to the high speed aerodynamic acceptance results. – See RHEOMETER.[183,223] [SAE AS5900, Venckeleer]

rheometer, 1. [rheology] a laboratory device to measure how a viscous fluid responds to applied forces. Rheometers that control the applied shear stress or shear strain are called rotational or shear rheometers whereas rheometers that apply extensional stress or strain are called extensional rheometers. **2.** [aircraft anti-icing fluid rheology] rotational rheometers can be used to generate viscosity vs shear stress curves, or RHEOLOGICAL PROFILES, of a thickened anti-icing fluid which have been correlated to the high speed aerodynamic acceptance results. – Compare VISCOMETER.[183,223] [SAE AS5900, Venckeleer]

rime, [meteorology] a rough, granular, opaque, milky or white ice formed by the instantaneous freezing of SUPERCOOLED WATER droplets upon contact with objects at temperatures below freezing. Trapped pockets of air cause the rime to be white and opaque. – Compare CLEAR ICE.[56,74,112,142,188] [MANOBS, Dunlop, ICAO 9640, NOAA FMH-1, SAE AS6285]

rinsibility, [liquid runway deicing products] a DETERMINE AND REPORT TEST in which the liquid runway deicing product is poured onto a clear glass panel in the horizontal position and subsequently inclined at an angle of 45° for ten minutes, then placed in the horizontal position for 24 hours at room temperature. After the 24-hour exposure the plate is rinsed for five minutes with

tap water, followed by a rinse on ASTM D1193 Type IV water and allowed to dry, then examined for visible traces of the runway deicing product.[169] [SAE AMS1435]

risk assessment, **1.** an evaluation based on engineering and operational judgment and/or analysis methods to establish whether the achieved or perceived risk is acceptable or tolerable, then, if required, implementing reasonable control and mitigating measures to remove or reduce the identified risk(s). **2.** the evaluation of the likelihood of undesired events and the likelihood of harm or damage being caused, together with the judgements made concerning the significance of the results. A risk assessment considers elimination, substitution, reduction, and adequate control of risks, through the identification of hazards, impact, and likelihood of events occurring. The decisions are taken based on relative ranking of risk reduction strategies or through the use of targets levels that are required to be met.[54,99,188,195] [CCOHS Risk, Gorse, SAE AS6285, Schaschke]

risk management, see SAFETY RISK MANAGEMENT.

roll, **1.** [aerodynamics] the motion of the aircraft about the LONGITUDINAL AXIS. **2.** [aerodynamics] one of the three dimensions of aircraft movement, the others being YAW and PITCH. **3.** roll is primarily controlled by AILERONS. **4.** the result of roll about the longitudinal axis produces a turn of the aircraft.[85,198] [FAA H-8083-3C, Shevell]

roll axis, see LONGITUDINAL AXIS.

root cause, factor(s), under the control of the organization, that caused a NONCONFORMANCE that should be addressed with a CORRECTIVE ACTION.[12,190,210] [ASQ Glossary, SAE AS6332, TC AC SUR-002]

rotorcraft, **1.** a heavier-than-air aircraft that depends principally for its support in flight on the lift generated by one or more rotors. **2.** any aircraft that generates lift through rotating blades or rotors, powered or unpowered. It includes helicopters, autogyros, and tiltrotors (like the V-22 Osprey). – Compare HELICOPTER, POWERED-LIFT.[1,28] [Atkins, 14 CFR § 1.1]

rotary-wing aircraft, see ROTORCRAFT.

rotation, **1.** [aerodynamics] the act of lifting the nose of the aircraft off the runway. The moment at which the control inputs can be applied to pitch up the nose, that is to rotate, is a predetermined speed called the ROTATION SPEED (V_r). **2.** [viscometry] motion given to the SPINDLE in ROTATIONAL VISCOMETERs.

rotation speed 1. [aerodynamics] (V_r), the speed at which the pilot begins to apply control inputs to cause the aircraft nose to pitch up, after which it will leave the ground. **2.** [viscometry] expression sometimes used to mean ROTATIONAL RATE. – See ROTATION, MINIMUM CONTROL SPEED, TAKEOFF DECISION SPEED, LIFTOFF SPEED, MINIMUM UNSTICK SPEED, TAKEOFF SAFETY SPEED.[183,198] [SAE AS5900, Shevell].

rotational rate, [viscometry] the rate at which the SPINDLE turns in ROTATIONAL VISCOMETERs, generally expressed in revolution per minute (rpm); *in the LOW SHEAR RATE VISCOSITY measurement*

of Type II/III/IV fluids the rotational rate is 0.3 rpm. – Synonyms: ROTATIONAL SPEED, ROTATION SPEED.

rotational speed, [viscometry] often used as synonym for ROTATIONAL RATE. [Rotational speed might imply a unit of length per unit of time–that is not the case here. Rotational speed is usually expressed as rotation per minute (rpm). It would seem preferable to use rotational rate as it would be a more accurate term].

rotational viscometer, **1.** [viscometry] type of viscometer relying on rotational motion to achieve simple shearing flow. To induce the flow, either the SPINDLE is driven at a known ROTATIONAL RATE and the resulting couple measured or else a couple is applied and the subsequent rotational rate is measured. **2.** [viscometry of deicing fluids] generally rotational viscometers (e.g., Brookfield or equivalent) are used for measuring the viscosity of aircraft anti-icing fluids. The rotational rate is set and the couple measured. – See LOW SHEAR RATE VISCOSITY.[14,31,191] [Ametek Brookfield, Barnes, SAE AS9968]

rotor ice protection system (RIPS), a system designed to prevent the formation of ice during flight on the rotor blades of HELICOPTERs and other ROTORCRAFT.

rotor icing, [rotorcraft] accumulation of frozen precipitation on a rotor. *rotor icing disrupts the airflow over the rotor reducing its efficiency and potentially causing vibrations*. See ENGINE ICING, GROUND ICING, IN-FLIGHT ICING, PROPELLER ICING.

roughness, see AERODYNAMIC ROUGHNESS.

routine adaptations, [safety science] deviations repeated over time, which have become standard practice. – See ADAPTATIONS.[219] [TSB]

rubber, [runway contaminant] a tough elastic polymeric substance made from the latex of a tropical plant or from synthetic material.[83] [SAE AC 150/5200-30D]

rudder, **1.** [aircraft component] a vertical moveable control surface part of the VERTICAL TAIL, normally hinged to the rear of the vertical FIN. **2.** movement of the rudder rotates the aircraft about its vertical axis, controlling YAW.[85,198] [FAA H-8083-3C, Shevell]

runback ice, [in-flight icing] ice formed by the freezing or refreezing of water leaving an area of the aircraft that is above freezing and flowing downstream to an area that is below freezing. Runback ice is often an unwanted side effect associated with ELECTROTHERMAL ICE PROTECTION SYSTEMs. See INTERCYCLE ICE, RESIDUAL ICE.[174] [SAE ARP5624]

runway concrete surface scaling resistance, **1.** a test method covering the determination of the resistance to scaling of a horizontal concrete surface exposed to freezing-and-thawing cycles in the presence of deicing chemicals. It is intended for use in evaluating this surface resistance qualitatively by visual examination. **2.** [aircraft deicing fluids, runway deicing products] a PASS-FAIL TEST classified under MATERIALS COMPATIBILITY to evaluate the effect of aircraft deicing fluid or runway deicing products on runway surfaces according to ASTM C672.[17,165,167,168,169,] [ASTM C672, SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435]

runway condition assessment matrix (RCAM)**,** a tool used by airport operators to assess and report runway surface conditions, particularly when contaminants (i.e., water, ice, slush, etc.) are present. It helps determine a RUNWAY CONDITION CODE (RWYCC), which is a standardized way to communicate the slipperiness of a runway to pilots for takeoff and landing performance calculations. The RCAM helps determine the extent to which these contaminants affect braking action and aircraft performance during takeoff and landing. It considers contaminant type, depth, and temperature (as necessary).[208208] [TC AC 700-057]

runway condition code (RWYCC), a standardized system used in aviation to report the condition of a runway surface. It provides a numerical value (ranging from 0 to 6) that indicates the slipperiness of the runway with 6 representing a dry runway and 0 representing an icy runway:

RWYCC 6: dry runway, optimal conditions:
RWYCC 5: wet runway or light snow/slush.
RWYCC 4: compacted snow.
RWYCC 3: higher levels of dry or wet snow.
RWYCC 2: slush or standing water.
RWYCC 0: icy runway.

– See RUNWAY CONDITION ASSESSMENT MATRIX. [208] [TC AC 700-057]

runway deicing product (RDP), **1.** a FREEZING POINT DEPRESSANT in solid form or in solution formulated with appropriate additives to be applied to runway or other airport paved surfaces for the purpose of preventing and removing frozen deposits. For example, POTASSIUM ACETATE, POTASSIUM FORMATE, SODIUM ACETATE, SODIUM FORMATE are freezing point depressants used in the formulation of runway deicing products. **2.** [aircraft brakes] a potential contaminant for carbon brakes.[160,168,169] [SAE AIR5490, SAE AMS1431, SAE AMS1435]

SAE, **1.** acronym for Society of Automotive Engineers. **2.** short for SAE International.

SAE standard, **1.** any document published by SAE International in the form of an aerospace material specification (AMS), aerospace standard (AS), aerospace information report (AIR), or aerospace recommended practice (ARP). **2.** any SAE International document that goes through a formal balloting process at two levels, at the committee level and the Aerospace Council level. **3.** document available for a fee from SAE International. **4.** document normally subject to a five-year committee review unless canceled or stabilized. **5.** revised standards are indicated sequentially by letters, the letter A for the first revision, the letter B for the second revision, and so forth (the letters I and Q are not used); *AMS1424 is the first issue, AMS1424A the first revision, AMS1424B the second revision*. **6.** normally SAE standards come with a (first) issue date, a revision date (if not the first issue), and an effective date—when there is no effective date on a standard, the revision date is taken to be the effective date; *SAE AS6285E was issued 2016-08, revised 2023-05, and became effective 2023-08*; *SAE AMS1424S was issued 1992-01 and revised 2023-03*. **7.** an SAE standard may be stabilized—that is frozen at the last active revision level—when the committee decides to no longer maintain the document for instance when the technology, product, or process is mature and not likely to change in the foreseeable future. It is given a new sequential letter and a stabilization date: *AIR5704A was stabilized 2023-11*. **8.** an SAE standard may be canceled when it is deemed not fit for use. It is given a new sequential letter and a cancelation date; *AS8243A was canceled 2010-04*. – See ABSTRACT.[159] [SAE Aerospace Council]

SAE website, see STANDARDSWORKS.

safety data sheet (SDS), **1.** standardized regulated mandatory documentation associated with a product (chemical) including the name of the product and its supplier, the properties of the major chemicals comprising the product, the physical, health, and environmental hazards, protective measures, and safety precautions for handling, storing, and transporting. **2.** safety data sheet was formerly known as material safety data sheet or MSDS. **3.** safety data sheets are MANDATORY DOCUMENTATION for AIRCRAFT DEICING FLUIDs and RUNWAY DEICING PRODUCTs.[55,147,148,165,167,168,169] [CCOHS, OSHA 2012, OSHA 2016, SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435]

safety management system (SMS), **1.** a systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies, and procedures. **2.** the formal, top-down, organization-wide approach to managing safety risk and assuring the effectiveness of safety risk controls. It includes systemic procedures, practices, and policies for management of safety risk. – Compare QUALITY MANAGEMENT SYSTEM.[52,92,190] [CARs 101.01, FAA SAS, SAE AS6332]

safety risk management, **1.** [safety science] assessment and mitigation of safety risks involving the systematic application of management policies, procedures, and practices to ensure that risk is reduced as low as reasonably practicable. **2.** [safety science] the process of describing the system, identifying the hazards, and analyzing, assessing, and controlling risk.[92,219] [FAA SAS, TSB]

sales specification, **1.** [aircraft deicing fluids, runway deicing products] a set of quality control limits established by a manufacturer for fluid to be sold. **2.** sales specification limits are related to but not necessarily the same as the IN-SERVICE LIMITS. – See PRODUCTION LIMITS.[127] [Guide]

sample, a small portion of a larger quantity of a product used to evaluate quality. – See REPRESENTATIVE SAMPLE.[127,195] [Guide, Schaschke]

sampling guideline, [deicing fluids] a document, usually prepared by fluid manufacturers, explaining in general terms how to safely proceed to obtain representative samples – Compare SAMPLING PROCEDURE. See SAMPLE, REPRESENTATIVE SAMPLE.[127] [Guide]

sampling procedure, a site-specific and/or equipment-specific procedure used to obtain representative samples. – Compare SAMPLING GUIDELINE. See SAMPLE, REPRESENTATIVE SAMPLE.[127] [Guide]

sand, **1.** [runway contaminant] a sedimentary material, finer than a granule and coarser than silt. **2.** an ice control product applied to movement areas at airports.[83,215] [FAA AC150/5200-30D, TC TP 312]

sandwich corrosion, 1. [metallurgy] the corrosive attack that occurs at the interface between two metal surfaces when a corrosive or conductive material is present between them. **2.** [aircraft deicing fluids, runway deicing, products] a PASS-FAIL TEST classified under MATERIALS COMPATIBILITY and performed according to ASTM F1110.[26,165,167,168,169] [ASTM F1110, SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435]

saturation, [meteorology] the theoretical limit to the amount of water vapor in the air at any given temperature and pressure; the saturation limits differ depending on whether one is considering transition into liquid water or into ice. – See DEWPOINT, FROST POINT, SATURATION MIXING RATIO OVER ICE, SATURATION MIXING RATIO OVER WATER.[195,219] [Schaschke, TSB]

saturation mixing ratio over ice, [meteorology] the mass of water vapor per unit mass of dry air when the air is saturated with respect to a plane surface of ice. The Smithsonian publishes meteorological tables giving the saturation mixing ratio (expressed as grams of water per kg of air) over liquid water and over ice as a function of temperature and pressure – Compare SATURATION MIXING RATIO OVER WATER. See FROST POINT, SATURATION, FROST FORMATION CHART.[11,128] [AMS Glossary, List]

saturation mixing ratio over water, [meteorology] the mass of water vapor per unit mass of dry air when the air is saturated with respect to a plane surface of liquid water. The Smithsonian publishes meteorological tables giving the saturation mixing ratio (expressed as grams of water per kg of air) over liquid water and over ice as a function of temperature and pressure. – Compare SATURATION MIXING RATIO OVER ICE. See DEWPOINT, SATURATION.[11,128] [AMS Glossary, List]

scope, **1.** [documentation] the extent and boundaries of what a document covers. **2.** [SAE documents] a required part of SAE standards that follows the RATIONALE and foreword. The first paragraph of the scope is used by SAE to describe the standard to potential purchasers. **3.** As of April 2025, the first paragraph of the scope of SAE G-12 standards must be presented as an ABSTRACT to help potential purchasers understand the content of the standards. This rule will be implemented when revising standards. – See SAE standard.[44,197] [Brittanica, Harmonization]

secondary wave, **1.** [fluid behavior subjected to aerodynamic forces] expression to describe the flow of fluid at or soon after rotation. **2.** the formation of the secondary wave is dependent on the geometry of the leading edge (e.g., with or without SLATS, high lift device, or HARD WING). **3.** the secondary wave plays a significant role in the transient lift degradation caused by fluids. – See FLOWOFF, PRIMARY WAVE, TRANSIENT AERODYNAMIC EFFECTS OF FLUIDS, ROTATION.[45,117,158] [Broeren, Koivisto, Runyan]

secure identification display area (SIDA), [FAA] a portion of an airport, specified in the airport security program, in which security measures specified in this part are carried out. This area includes the secured area and may include other areas of the airport.[218] [49 CFR § 1540.5]

semi-fan shape, [aircraft deicing] a moderately wide SPRAY PATTERN, somewhere in between a SOLID STREAM and a FAN SHAPE pattern.[171] [SAE ARP 1971]

senior management, 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 the winter operation.[189,190] [SAE AS6286, SAE AS6332]

separation, 1. [aerodynamics] the phenomenon where the boundary-layer flow over a body (e.g., a wing) breaks away from the surface, in other words when the BOUNDARY LAYER can no longer continue around the body. The location where this happens is called the boundary-layer separation point. Beyond the separation point, the flow may stagnate or reverse direction as there is no fluid

from the front filling the space–the flow is unstable and breaks up into eddies. **2.** [chemistry] the parting of materials into constituent parts; *examples of separation processes are chromatography, distillation, filtration, centrifugation, precipitation, evaporation, drying, electrolysis, decantation, and desorption*.[195,198] [Schaschke, Shevell]

service provider, [aircraft deicing] the organization responsible for the aircraft deicing/anti-icing operations at an airport.[190,216] [SAE AS6332, TC TP 14052]

shall, **1.** required. **2.** [aircraft deicing] mandatory term to convey the intent of meeting a regulatory requirement or other requirement, e.g., SAE STANDARD. – Synonyms: IS/ARE REQUIRED, MUST.[89,188,212] [FAA HOT, SAE AS6285, TC HOT]

shear degradation, **1.** [aircraft deicing] the undesirable process of reducing permanently and irreversibly the viscosity of Type II/III/IV fluids through the application of excessive shear force. **2.** [aircraft deicing] a degradative process causing irreversible damage to the thickeners in Type II/III/IV fluids. **3.** shear degradation is thickener specific, in other words some fluid will shear degrade more easily than others; *this Type IV is more sensitive to shear degradation than that Type IV*. – See SHEAR FORCE, NOZZLE SAMPLE[127] [Guide]

shear force, **1.** [engineering] an applied force to a material that acts in the direction that is parallel to a plane rather than perpendicular. **2.** [aircraft deicing] when acceptable shear force applied to Type II/III/IV, the viscosity of the fluid decreases and recovers when the shear force is no longer applied. **3.** [aircraft deicing] when excessive shear force is applied to Type II/III/IV fluids, an unwanted irreversible viscosity reduction may occur. **4.** [aircraft deicing] excessive shear force may be applied to Type II/III/IV fluids whenever the fluid is pumped (e.g., gear pump, centrifugal pump), forced through an orifice or restriction (e.g., nozzle, restriction in a pipe, sharp bend in piping, dry disconnect coupling), or when subjected to impingement (e.g., fluid hitting a surface at high velocity pushed by FORCED AIR application or fluid hitting a sample container too close to a nozzle). – See SHEAR DEGRADATION, IMPINGEMENT, NON-NEWTONIAN FLUID, PSEUDOPLASTIC FLUID.[112,195] [ICAO 9640, Schaschke]

shear rate, **1.** the difference in velocity of any two layers of fluid over the distance separating the two layers. **2.** the SI unit for shear rate is the reciprocal second, s^{-1}.[127,195] [Guide, Schaschke]

shear stress, **1.** a force per unit area acting parallel to the surface. **2** the SI units for shear stress are newton/meter square, N/m^2.[127,195] [Guide, Schaschke]

shear thinning fluid, a fluid whose viscosity decreases when a SHEAR FORCE is applied (e.g., ketchup, wall paint, Type II/III/IV fluids) – Synonym: PSEUDOPLASTIC FLUID.[28,196] [Atkins, Schlichting]

shelf life, **1.** the time a product is expected to be usable or saleable when stored under appropriate conditions. **2.** [aircraft deicing] an unpublished internal tool for fluid manufacturers to set the time of product verification for a certain period after production or retesting at fluid manufacturer storage sites. **3.** [aircraft deicing] an external tool for fluid manufacturers to recommend product verification after a certain period of storage at customer sites; *when a product is within shelf life, it does not necessarily mean it is on spec*. – Compare ON SPEC, OFF SPEC.[99,127,188] [Gorse, Guide, SAE AS6285]

should, **1.** [SAE] to express or strongly encourage a practice **2.** [regulatory] that would meet or exceed the intent of a recommendation of a method of achieving safety unless an alternative method were implemented.[89,188,212] [FAA HOT, SAE AS6285, TC HOT]

significant figures, **1.** indication of the precision of a measurement or calculation by showing the numbers known reliably plus one estimated or uncertain number. **2.** digits of a number or value beginning farthest to the left that is not zero and ending with the last digit farthest to the right that is not zero or a zero that is considered certain or estimated; *a measurement of 1.234 grams has four significant figures, 1.27 grams has three significant figures, 1.4 grams has two significant figures, 3.1 x 10^3 has two significant figures, 3.10 x 10^3 has three significant figures, 3.100 x 10^3 has four significant figures*. **3.** the concept of significant figures in measurements relates to the fact that a measured value cannot be more precise than the equipment being used to make the measurement and should not be reported in such a manner that it implies more precision that there really is.[33,205] [Bell, Stewart]

sintering, **1.** [chemistry] the process of compacting a powdered material at a temperature below its melting point. **2.** [physics of snow] sintering of snow refers to the process by which snow and ice particles bond together at temperatures below the freezing point.[151,152] [Ramseier, Rennie]

site qualification (SQ), **1.** [aircraft deicing fluids] process by which a fluid is qualified at a manufacturing site. If there is more than one production unit at a site, each unit needs to be qualified. **2.** [runway deicing products] for RUNWAY DEICING PRODUCTs, if produced by a LICENSEE or SUBCONTRACTOR, the site needs to perform the test of an initial qualification. Compare INITIAL QUALIFICATION, PERIODIC REQUALIFICATION, MULTIPLE LOCATION QUALIFICATION, UNIT QUALIFICATION.[165,167,168,169] [SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435]

situational adaptations, [safety science] deviations occurring when there is pressure to get the job done and/or there are constraints on the availability of resources, including the design and condition of the work area, equipment availability and design, time pressure, number of staff, supervision, and external environmental factors. – See ADAPTATIONS.[219] [TSB]

situational awareness, [safety science] the continuous extraction of environmental information, the integration of this information with previous knowledge to form a coherent mental picture, and the use of that picture in directing further perception and anticipating future events; *being aware of weather changing; colloquially: keep your head on a swivel when you are on a deicing pad; you are situationally aware when what you believe is happening overlaps with what is actually happening*.[206,219] [Thomson, TSB]

slats, **1.** [aircraft component] moveable surfaces on the leading edge of the WING, normally with a carefully designed gap between the extended (deployed) surface and the wing to control lift during takeoff and landing. **2.** [aircraft deicing] when slats (and FLAPS) are kept extended (deployed) after deicing/anti-icing during taxi, the STANDARD HOLDOVER TIME and STANDARD ALLOWANCE TIME are reduced. – See ADJUSTED HOLDOVER TIME, ADJUSTED ALLOWANCE TIME.[85,198] [FAA H-8083-3C, Shevell]

sleet, **1.** [meteorology] another name for ICE PELLETS. **2.** [meteorology] in British terminology, and colloquially in some parts of the United States, precipitation in the form of a mixture of rain and snow.[11,74] [AMS Glossary, Dunlop]

sliding angle, [surface chemistry] the tilt angle at which a water drop starts to slide on the surface and varies between 0 and 90 degrees. – Synonym: ROLL-OFF ANGLE.[162] [SAE AIR6232]

slippery when wet, [runway contaminant] a wet runway where the surface friction characteristics would indicate diminished braking action as compared to a normal wet runway.[83] [FAA AC150/5200-30D]

slot management, departure allocation program intended to meter departing air traffic.[175] [SAE ARP5660]

slush, 1. a watery mixture of partly melted snow, with or without FREEZING POINT DEPRESSANTs; *slush covered sidewalk, slush on the wing*. **2.** [meteorology] snow or ice on the ground that has been reduced to a soft watery mixture by rain, warm temperature, and/or chemical treatment. **3.** [runway contaminant] snow that has water content exceeding a freely drained condition such that it takes on fluid properties (e.g., flowing and splashing). Water will drain from slush when a handful is picked up. This type of water-saturated snow will be displaced with a splatter by a heel and toe slap-down motion against the ground. – See SPLASH UP.[11,83,112,135,188,203,216] [AMS Glossary, FAA AC150/5200-30D, ICAO 9640, Myers, SAE AS6285, SIAGDP, TC TP 14052]

slush over ice, [runway contaminant] snow that has water content exceeding a freely drained condition such that it takes on fluid properties (e.g., flowing and splashing) over the solid form of frozen water.[83] [FAA AC150/5200-30D]

small hail, **1.** [meteorology] pellets of snow encased in a thin layer of ice which have formed from the freezing, either of droplets intercepted by the pellets, or of water resulting from the partial melting of the pellets with diameter generally smaller than 5 mm. **2.** hail includes small hail, but the reverse is not true. **3.** METAR CODE in the US is GR with remark less than ¼, in Canada SHGS with remark stating the diameter of hail, in Europe GS. **4.** [aircraft deicing] a precipitation with allowance times.[56,89,112,142,212] [MANOBS, FAA HOT, ICAO 9640, NOAA FMH-1, TC HOT]

small sample adapter, [viscometry] a viscometer accessory used to measure the viscosity of small sample volumes, typically ranging from 2 to 16 mL. It consists of a cylindrical sample chamber and a torpedo shaped SPINDLE providing a defined geometry system for accurate viscosity measurements at precise shear rates. The design allows for easy changing and cleaning of the sample chamber without disturbing the viscometer setup, ensuring consistent measurement conditions. The sample chamber can be fitted into a double wall jacket in which a heat exchange fluid circulates for precise temperature control when connected to a circulating temperature bath.[47] [Brookfield SSA]

snow, **1.** [meteorology] precipitation composed of white or translucent ice crystals, mostly branched in the form of six-pointed or hexagonal stars. At temperatures higher than about -5 °C, the crystals are generally clustered to form snowflakes. **2.** [aircraft deicing] precipitation whose intensity for holdover times is determined from the snowfall visibility table and not directly from

the METAR intensity qualifier. **3.** [endurance time testing] the snowfall intensities for endurance testing are very light, light, and moderate snow.

very light snow, **4.** [endurance time testing] an endurance time testing condition with a precipitation rate of 3–4 g/dm^2/h. **5.** [aircraft deicing] a precipitation condition with a holdover time where the precipitation intensity is obtained from METAR/SPECI or flightcrew observed visibility using the snowfall visibility table.

light snow, **6.** [meteorology] a precipitation METAR CODE -SN. 8. [endurance time testing] endurance time testing condition with a precipitation rate of 4–10 g/dm^2/h. **7.** [aircraft deicing] a precipitation condition with a holdover time where the precipitation intensity is obtained from METAR/SPECI or flightcrew observed visibility using the snowfall visibility table.

moderate snow, **8.** [meteorology] a precipitation with METAR code SN. **9.** [endurance time testing] endurance time testing condition with a precipitation rate of 10–25 g/dm^2/h. **10.** [aircraft deicing] a precipitation condition with a holdover time where the precipitation intensity is obtained from METAR/SPECI or flightcrew observed visibility using the snowfall visibility table.

heavy snow, **11.** [meteorology] a precipitation with METAR code +SN. **12.** [aircraft deicing] a precipitation condition without a holdover time.

– See SNOWFALL VISIBILITY TABLE, BLOWING SNOW, NATURAL SNOW, ARTIFICIAL SNOW, PRECIPITATION RATE.[34,56,112,142,173,188,189,203] [Bendickson, MANOBS ICAO 9640, NOAA FMH-1, SAE ARP5485, SAE AS6285, SIAGDP]

snow-bridging failure, [aircraft deicing fluid failure] a visual mode of fluid failure under snow conditions when the fluid resists dilution and a thick film of fluid remains on the entire surface. The fluid with more incoming snow no longer absorbs the snow, which piles on top of the fluid. Snow-bridging failures do not always occur from the upper to lower sections of test surfaces or wings. Snow-bridging failures are common at cold temperatures and high rates of precipitation. – Compare DILUTION FAILURE. See FLUID FAILURE, FLUID FAILURE CRITERIA, VISUAL FAILURE.[177] [SAE ARP5945]

snow accompanied by blowing snow or drifting snow, [aircraft deicing] a precipitation condition with a holdover time where the precipitation intensity is obtained from METAR/SPECI or flightcrew observed visibility using the SNOWFALL VISIBILITY TABLE.[89,212] [FAA HOT, TC HOT]

snow desk, **1.** operational position at a deicing facility control center where all aircraft deicing operations are coordinated, and equipment is dispatched. **2.** control position, person, or desk for all the activities at an airport (e.g., snow plows, snow removal, gate control, deicing) related to a snow event.[175] SAE [ARP5660]

snow grains, **1.** [meteorology] precipitation in the form of very small, white, opaque particles of ice; the solid equivalent of DRIZZLE. These resemble SNOW PELLETS in appearance but are more flattened and elongated, and generally have diameters of less than 1 mm. When the grains hit hard

ground, they do not bounce or shatter. **2.** [aircraft deicing] precipitation whose intensity for holdover times is determined from the snowfall visibility table and not directly from the METAR intensity qualifier. **3.** [endurance time testing] the snow grains intensities for endurance testing are very light, light, and moderate snow grains.

very light snow grains, **4.** [endurance time testing] an endurance time testing condition with a precipitation rate of 3–4 g/dm^2/h. **5.** [aircraft deicing] a precipitation condition with a holdover time where the precipitation intensity is obtained from METAR/SPECI or flightcrew observed visibility using the snowfall visibility table.

light snow grains, **6.** [meteorology] a precipitation METAR CODE -GS. **7.** [endurance time testing] endurance time testing condition with a precipitation rate of 4–10 g/dm^2/h. **8.** [aircraft deicing] a precipitation condition with a holdover time where the precipitation intensity is obtained from METAR/SPECI or flightcrew observed visibility using the snowfall visibility table.

moderate snow grains, **9.** [meteorology] a precipitation with METAR code GS. **10.** [endurance time testing] endurance time testing condition with a precipitation rate of 10–25 g/dm^2/h. **11.** [aircraft deicing] a precipitation condition with a holdover time where the precipitation intensity is obtained from METAR/SPECI or flightcrew observed visibility using the snowfall visibility table.

heavy snow grains, **12.** [meteorology] a precipitation with METAR code +GS. **13.** [aircraft deicing] a precipitation condition without a holdover time.

– See SNOWFALL VISIBILITY TABLE, PRECIPITATION RATE.[56,74,89,112,142,188,189,203,212] [FAA HOT, MANOBS, Dunlop, ICAO 9640, NOAA FMH-1, SAE AS6285, SAE AS6286, SIAGDP, TC HOT]

snow grains accompanied by blowing snow or drifting snow, [aircraft deicing] a precipitation condition with a holdover time where the precipitation intensity is obtained from METAR/SPECI or flightcrew observed visibility using the SNOWFALL VISIBILITY TABLE.[89,212] [FAA HOT, TC HOT]

snow machine, [aircraft deicing fluid testing] a device or combination of devices to make and dispense ARTIFICIAL SNOW at controlled know rates of precipitation onto STANDARD TEST PLATEs to measure aircraft deicing/anti-icing fluid ENDURANCE TIMEs. – See AMIL SNOW MACHINE, NCAR SNOW MACHINE. Synonym: SNOWMAKER.

snow mixed with ice crystals or freezing fog, [aircraft deicing] a precipitation condition with a holdover time where the precipitation intensity is obtained from METAR/SPECI or flightcrew observed visibility using the SNOWFALL VISIBILITY TABLE.[89,212] [FAA HOT, TC HOT]

snow pellets, **1.** [meteorology] precipitation of white and opaque particles of ice; these ice particles are either round or conical, their diameter is approximately 2–5 mm. Snow pellets are brittle and easily crushed; when they fall on hard ground, they bounce and often break up. **2.** [aircraft deicing] precipitation whose intensity for holdover times is determined from the snowfall visibility table

and not directly from the METAR intensity qualifier. **3.** [endurance time testing] the intensities for snow pellets endurance testing are very light, light, and moderate.

very light snow pellets, **4.** [endurance time testing] an endurance time testing condition with a precipitation rate of 3–4 g/dm^2/h. **5.** [aircraft deicing] a precipitation condition with a holdover time where the precipitation intensity is obtained from METAR/SPECI or flightcrew observed visibility using the snowfall visibility table.

light snow pellets, **6.** [meteorology] a precipitation METAR CODE -GR. **7.** [endurance time testing] endurance time testing condition with a precipitation rate of 4–10 g/dm^2/h. **8.** [aircraft deicing] a precipitation condition with a holdover time where the precipitation intensity is obtained from METAR/SPECI or flightcrew observed visibility using the snowfall visibility table.

moderate snow pellets, **9.** [meteorology] a precipitation with METAR code GR. **10.** [endurance time testing] endurance time testing condition with a precipitation rate of 10–25 g/dm^2/h. **11.** [aircraft deicing] a precipitation condition with a holdover time where the precipitation intensity is obtained from METAR/SPECI or flightcrew observed visibility using the snowfall visibility table.

heavy snow pellets, **12.** [meteorology] a precipitation with METAR code +GR. **13.** [aircraft deicing] a precipitation condition without a holdover time.

– See SNOWFALL VISIBILITY TABLE, PRECIPITATION RATE.[56,74,89,112,142,188,203,212] [FAA HOT, MANOBS, Dunlop, ICAO 9640, NOAA FMH-1, SAE AS6285, SIAGDP, TC HOT]

snow pellets accompanied by blowing snow or drifting snow, [aircraft deicing] a precipitation condition with a holdover time where the precipitation intensity is obtained from METAR/SPECI or flightcrew observed visibility using the SNOWFALL VISIBILITY TABLE.[89,212] [FAA HOT, TC HOT]

snow tests, **1.** [aircraft deicing fluid testing] tests to measure the endurance time of aircraft deicing fluids subjected to snow. **2.** snow tests can be performed by three methods: **method A**: outdoors with natural snow, **method B**: indoors with collected artificial snow or collected natural snow, storing the artificial snow or collected natural snow, and distributing either systematically over the test plates or **method C**: indoors with artificial snow made as the test is being performed. Artificial snow is made by a) spraying fine water droplets in a cold chamber resulting in fine solid ice crystals that are collected on the cold chamber floor (used in method B) or b) shaving ice cores into ice shavings with a so-called NCAR SNOW MACHINE (used in method C). Outdoor tests are performed under uncontrolled weather conditions, which means all desired temperature/snow PRECIPITATION RATE combinations may not be tested during a given winter; indoor tests are performed under controlled conditions. Holdover times for snow are derived from endurance times measured with natural snow outdoors using method A. – See SNOW, NATURAL SNOW, ARTIFICIAL SNOW.[173,177] [SAE ARP5485, SAE ARP5945]

snowfall intensities as a function of prevailing visibility, see SNOWFALL VISIBILITY TABLE.

snowfall intensity, **1.** [aircraft deicing] intensities obtained by converting METAR/SPECI reported prevailing visibility or flightcrew observed visibility for snow, snow grains, or snow pellets accompanied by blowing snow or drifting snow, snow mixed with ice crystals or freezing fog using the snowfall visibility table. **2.** [aircraft deicing] the snowfall intensities to be used with the Type I/II/III/IV holdover time guidelines are very light, light, moderate, and heavy. **3.** the holdover time snowfall intensities (very light, light, moderate, heavy) are different from the meteorological intensity qualifiers (light (-), moderate (no symbol), heavy (+)). – See INTENSITY QUALIFIER, SNOWFALL VISIBILITY TABLE.[88,89,212] [FAA GENERAL, FAA HOT, TC HOT]

snowfall visibility table, **1.** [holdover time] the short form for the table entitled "Snowfall intensities as a function of prevailing visibility" published in the FAA and Transport Canada *Holdover Time Guidelines*. **2.** [holdover time] table used to convert METAR/SPECI reported prevailing visibility or flightcrew observed visibility for snow, snow grains, snow pellets precipitation conditions. The snowfall visibility table is also used when snow, snow grains, or snow pellets are accompanied by blowing or drifting snow, or when snow is mixed with ice crystal or freezing fog in the METAR/SPECI. – See SNOWFALL INTENSITY.[88,89,212] [FAA GENERAL. FAA HOT, TC HOT]

snowflake, [meteorology] an ice crystal, or aggregation of ice crystals that fall from a cloud.[11] [AMS Glossary]

snowmaker, see SNOW MACHINE.

SNOWTAM, a special series NOTAM (Notice to Airmen) that provides a surface condition report (specifically for use with runways) for hazardous conditions due to snow, ice, slush, frost, or standing water. Uses information provided from the RUNWAY CONDITION CODE (RWYCC).

sodium acetate, **1.** [chemistry] Chemical Abstract registry number 127-09-3, alternate name: acetic acid sodium salt (1:1); molecular formula $C_2H_3NaO_2$; molecular weight 82.03. **2.** [runway deicing products] a FREEZING POINT DEPRESSANT used in RUNWAY DEICING PRODUCTs. – Compare SODIUM FORMATE, POTASSIUM ACETATE, POTASSIUM FORMATE.[144] [Merck Index]

sodium formate, **1.** [chemistry] Chemical Abstract registry number 141-53-7, alternate name: formic acid sodium salt (1:1); molecular formula $CHNaO_2$; molecular weight 68.01. **2.** [runway deicing products] a FREEZING POINT DEPRESSANT used in RUNWAY DEICING PRODUCTs. – Compare SODIUM ACETATE, POTASSIUM ACETATE, POTASSIUM FORMATE.[144] [Merck Index]

solid stream, [aircraft deicing] a SPRAY PATTERN in the form of a narrow high-pressure jet of fluid. – Compare SEMI-FAN SHAPE, FAN SHAPE.[171] [SAE ARP 1971]

solute, [chemistry] the substance dissolved in a SOLVENT forming a SOLUTION.[152] [Rennie]

solution, [chemistry] the resultant homogeneous mixture of a SOLVENT and a SOLUTE.[127,150] [Guide, Rennie]

solvent, [chemistry] a liquid that dissolves another substance or substances.[152] [Rennie]

specific gravity, 1. [chemistry] the dimensionless ratio of the mass of a volume of a substance to the same volume of another reference substance. The usual reference substance is water. The substance and the reference substance may be at the same or different temperatures. The measurement temperatures must be specified with the result. **2.** [aircraft deicing fluids] a PHYSICAL PROPERTY used as SURROGATE for glycol concentration and FREEZING POINT in aircraft deicing fluids. It is a DETERMINE AND REPORT TEST in INITIAL QUALIFICATION and a PASS-FAIL TEST in subsequent tests. The SAE G-12 Aircraft Deicing Fluids Committee resolved to abandon this measurement in AMS1424 and AMS1428 as it is redundant with the measurement of REFRACTION. – Synonyms: apparent specific gravity, relative density, relative volumic mass. See DIMENSIONLESS QUANTITY. [94,99,152,165,167,192] [Fenna, Gorse, Rennie, SAE AMS1424, SAE AMS1428, SAE G-12 ADF 20240513]

specimen sheet, **1.** [training] a reference list containing the signatures and the initials of employees. New hire employees are added to the sheet at the completion of training. The purpose of the specimen sheet is to verify an employee's signature or initials against what is recorded on the record of procedural changes and other official documentation and therefore the validity of the entry. **2.** digital signatures linked to employee numbers.[216] [TC TP 14052]

spent deicing fluid, **1.** sprayed deicing/anti-icing fluid that has fallen to the ground. **2.** sprayed deicing/anti-icing fluid that may be recovered and recycled. – See LOW CONCENTRATION SPENT DEICING FLUID, COMPLIANT SPENT DEICING FLUID, HIGH CONCENTRATION SPENT DEICING FLUID.

spindle, **1.** [viscometry] interchangeable component of a rotational viscometer that is immersed in the fluid being tested with a stem that connects it mechanically or magnetically to the viscometer. **2.** [viscometry of thickened fluids] typically the spindles used for measuring the viscosity of Type II/III/IV fluids have different geometries such as the cylindrical LV-1 and LV-2, the disk LV2 which is a disk, and the torpedo shaped SC4-31/13R and SC4-34/13R inserted in a cylindrical container called the sample chamber. The torpedo shaped spindle and the sample chamber together are called the SMALL SAMPLE ADAPTER. **3.** the spindle rotates at a controlled ROTATION RATE (expressed as rotation per minute) generating a couple from which the shear viscosity is calculated. – See LOW SHEAR RATE VISCOSITY. [46] [Brookfield Spindles]

spinner, [aircraft engine] a cone-shaped component located at the front of the engine, covering the hub and the base of the fan blades. Its purpose is to improve the aerodynamic flow into the engine. The spinner is susceptible to icing.[108] [Horrigan 2013]

splash filling, see SPLASH LOADING.

splash loading, [chemical industry] loading a tank from the top without a vertical fill pipe going down into the tank such that the filling is above the liquid surface during much of the filling, increasing turbulence and agitation, often causing air entrapment in the fluid. – Synonym: SPLASH FILLING. Compare SUBMERGED LOADING, BOTTOM LOADING.

splash up, [aircraft icing] phenomenon where SLUSH, water, or snow on runways or taxiways is thrown upward by the aircraft wheels during takeoff, landing, or taxiing. This material can adhere to the aircraft underwing, flaps, flap tracks, undercarriage, brakes or any lower surfaces, where it

may freeze due to low temperatures, potentially leading to hazardous ice accumulation.[188] [SAE AS6285]

spray no-spray diagram, [aircraft deicing] graphical representation of aircraft surfaces delineating zones appropriate for spraying, areas where no-spray is permitted, regions that must not receive direct spray, sections restricted from the application of Type II, III or IV fluids, as well as other indications on spraying procedure. See NO-SPRAY AREAS, NO DIRECT SPRAY AREAS, NO-SPRAY TYPE II, TYPE III, OR TYPE IV AREAS, SPRAY PATTERN.[164] [AIR8468]

spray pattern, [aircraft deicing] the shape and distribution of the fluid as it exits the NOZZLE onto the aircraft surface. The objective is to optimize coverage and effectiveness while minimizing waste and overspray. Common spray patterns include SOLID STREAM, SEMI FAN SHAPE, and FAN SHAPE, each chosen based on the surface being treated, the type of contamination to be removed or precipitation to be protected against, and the Type of fluid being sprayed. – See TYPE I, Type II/III/IV, SPRAY NO-SPRAY DIRAGRAM.[171,216] [SAE ARP1971, TC TP 14052]

spreading rate, [runway deicing products] refers to the quantity of a deicing product applied per unit area of a runway surface. It is typically measured in grams per square meter (g/m^2) or pounds per square foot (lb/ft^2).

spoiler check, [aircraft deicing] the verification of a spoiler panel for contamination; considered a last-chance check for surface contamination before takeoff.[219] [TSB]

spoilers, [aircraft component] high-drag devices that can be raised into the air flowing over an AIRFOIL, reducing lift and increasing drag. Spoilers are used for roll control on some aircraft. Deploying spoilers on both wings at the same time allows the aircraft to descend without gaining speed. Spoilers are also used to shorten the ground roll after landing. – See SPOILER CHECK.[85,198] [FAA H-8083-3C, Shevell]

stabilization date, see SAE STANDARD.

staging area, [aircraft deicing] dedicated area behind and/or adjacent to each deicing bay, where aircraft await approval to enter the deicing bay.[175] [SAE ARP5660]

staging bay, [aircraft deicing] a dedicated area behind and adjacent to each deicing bay, where aircraft await approval to enter the deicing bay.[216] [TC TP 14052]

stall, [aerodynamics] a rapid decrease in lift caused by the separation of airflow from the wing surface brought on by exceeding the CRITICAL ANGLE OF ATTACK.[85,198] [FAA H-8083-3C, Shevell]

stalled front, 1. [meteorology] a boundary between two air masses (usually a warm air mass and a cold air mass) that is not moving or is moving very slowly (< 5 kts). **2.** [meteorology] also known as a STATIONARY FRONT or QUASI-STATIONARY FRONT.

standard allowance time, an ALLOWANCE TIME that is not adjusted. – Compare ADJUSTED ALLOWANCE TIME.[176,178] [SAE ARP5718, SAE ARP6207]

standard aluminum test plate, [aircraft deicing fluid testing] aluminum test plate (AMS4037, AMS4041 (superseded by the newer AMS4462), or AMS4462) used for endurance time testing of Type I and Type II/III/IV fluids in accordance with ARP5945 and ARP5485. Aluminum test plates are uncoated and possess an average surface roughness of 0.5 micrometers or less. – Synonym ALUMINUM TEST PLATE. Compare STANDARD COMPOSITE TEST PLATE. See STANDARD TEST PLATE.[162] [SAE AIR6232, SAE ARP5485, SAE ARP5945]

standard composite test plate, **1.** [aircraft deicing fluid testing] composite (carbon fiber cross weave fabric) test plate utilized for endurance time testing of Type I fluids, but not Type II/III/IV fluids, in accordance with ARP5945. Composite test plates are coated with aircraft grade white paint. **2.** composite test plates were introduced for testing of Type I fluids in SAE ARP5945A in 2007–prior to this only ALUMINUM TEST PLATEs were used. – Synonym: COMPOSITE TEST PLATE. See STANDARD TEST PLATE. Compare STANDARD ALUMINUM TEST PLATE [162] [SAE ARP5945]

standard dilution of Type II/III/IV fluid, a product/water ratio by volume of 100/0, 72/25, or 50/50. – Compare NON-STANDARD DILUTION OF TYPE II/III/IV FLUID.[127] [Guide]

standard holdover time, a holdover time that is not adjusted. – Compare ADJUSTED HOLDOVER TIME.[176,178] [SAE ARP5718, SAE ARP6207]

standard plate failure, **1.** [fluid testing] refers to the visual identification of failure on a test plate when a) the failure front on the plate reaches the 15 cm (6 in.) mark, or b) when snow bridging or contamination is observed, including LOSS OF GLOSS or a change in color to gray, over 5 of the 15 CROSSHAIRs, or c) when it is estimated that contamination covers one third of the test plate surface**.** **2.** standard plate failure is a visual failure based on the comparison to conditions on full-scale aircraft. – See STANDARD TEST PLATE.[60,135] [Chaput, Myers]

standard test plate, **1.** [fluid testing] a plate used for endurance time testing used to generate holdover times. **2.** an aluminum alloy (AMS4037, AMS4041 (superseded by AMS4462) or composite (carbon fiber cross weave fabric) 500 mm long, 300 mm wide and 3.2 mm thick adopted by SAE for the evaluation and qualification of deicing/anti-icing fluids. **3.** Along the top and two sides a line is marked 2.5 cm (1 in.) from the edge; ice crystals commencing in these zones are ignored as outside the test area. The bottom edge is unmarked. The test area of the test plate is about 75 percent of the total area. The plate is marked with horizontal lines parallel to the top edge at 7.5 cm (3 in.), 15 cm (6 in.), 22.5 cm (9 in.), 30 cm (12 in.), and 37.5 cm (15 in.). Each of these five lines has three crosshairs: one in the middle and two 7.5 cm (3 in.) apart for a total of 15 CROSSHAIRs. **4.** standard test plates are mounted at ten degrees (10°) to the horizontal. **5.** test plates used for ANTI-ICING PERFORMANCE, named ANTI-ICING PERFORMANCE TEST PLATEs, are different from standard test plates. – See STANDARD ALUMINUM TEST PLATE, STANDARD COMPOSITE TEST PLATE, FROSTICATOR TEST PLATE..[135,177,184] [Myers, SAE ARP5945, SAE AS5901]

StandardsWorks, the name of the SAE website where SAE Committees hold information such as minutes of meetings, ballot documents, maintain documents available to the public, etc. https://standardsworks.sae.org/standards-committees/g-12adf-aircraft-deicing-fluids.

static air temperature (SAT), [in-flight parameters] the temperature of undisturbed air, which is the temperature that could be read if you could suspend a thermometer out in the air without having

the effect of temperature rise due to the movement of the aircraft. Static air temperature is the TOTAL AIR TEMPERATURE minus RAM RISE. – See OUTSIDE AIR TEMPERATURE. [86] [FAA H-8383-31B]

stationary front, 1. [meteorology] a front that is moving less than 5 kts. **2.** also referred to as a QUASI-STATIONARY FRONT or STALLED FRONT. – See AIR MASS.[11] [AMS Glossary]

stoichiometry, [chemistry] the quantitative study of the relative proportion of reactants and products in chemical reactions.[152,195] [Rennie, Schaschke]

storage stability, **1.** [material science] constancy of a property over time. **2**. the ability of a product to be within established parameters, such as chemical, physical, or mechanical properties, over a specified time under specified conditions. **3. [**aircraft deicing fluids, runway deicing products] the ability of the product to be within the specified performance, operational or physical property over a specified time under specified conditions. – See SHELF LIFE.[106,165,167,168,169] [Hibbert, SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435]

storage tank, **1.** usually a large vessel for holding fluids that can be fixed or moveable such as FRAC TANKs or ISOTAINERs not used for transportation, excluding mobile equipment used for transportation such as TANK TRUCKs. **2.** any vessel used for storage; *this tote is used as a storage tank.*[188] [SAE AS6285]

storage vessel, any vessel used for storage. – See STORAGE TANK.

stormwater, the portion of water from rainstorms or melting snow which flows over land into storm drains or surface waters.[62,149] [Calgary, Park]

strake, a vertical component of the wingtip device installed outboard extending downward and therefore unobservable from inside the aircraft.[216] [TC TP 14052]

stress, **1.** [engineering] a force per unit area; the unit of stress is the newton per square meter (N/m^2) or pascal (P). **2.** [human factors] the physiological or psychological response to internal or external stressors.[13,127] [APA, Guide]

stress-corrosion resistance, **1.** [aircraft materials] the ability of a material to withstand stress corrosion cracking, a type of failure caused by the combined effects of tensile stress and a corrosive environment. Stress corrosion cracking can lead to sudden and catastrophic failure of components, even if the overall corrosion damage appears minimal. **2.** [aircraft deicing fluids and runway deicing products] a PASS-FAIL TEST classified under MATERIALS COMPATIBILITY that determines the propensity of a product to cause stress corrosion in AMS4911 titanium alloy and is performed according to ASTM F945.[25,165,167,168,169][ASTM F945, SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435]

strut, **1.** [aircraft components] a structural component used in various parts of the aircraft. **2.** a strut that connects the engine to the aircraft WING or FUSELAGE is also known as a PYLON. It provides support and stability for the engine.

subcontractor, **1.** an individual or firm that does part or all of a job for which another individual or firm is responsible. **2.** [aircraft deicing fluid and runway deicing products] an organization manufacturing an aircraft deicing fluid or RUNWAY DEICING PRODUCT on behalf of the original manufacturer or licensee. The original manufacturer or licensee (as the case may be) must qualify the product manufactured at the subcontractor site(s). **3.** for Type I aircraft deicing fluids the subcontractor site qualification consists of either a) an initial qualification if the manufacturing process (including materials) is not essentially the same as of the original fluid manufacturer or b) aerodynamic test(s) and a single water spray endurance time (three panels only) if the manufacturing process is essentially the same as the original manufacturer. **4.** for Type II/III/IV aircraft deicing fluids the licensee site qualification consists either of a) an initial qualification if the manufacturing process (including materials) is not essentially the same as of the original fluid manufacturer or b) aerodynamic test(s), a single water spray endurance time (three panels only), and viscosity, if the manufacturing process is essentially the same as the original manufacturer. **5.** for runway deicing products, the subcontractor site qualification consists of an initial qualification. – Compare ORIGINAL MANUFACTURER, LICENSEE, VENDOR, PURCHASER.[53,132,165,167,168,169] [Cambridge, MW, SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435]

sublimate, [meteorology and chemistry] a solid formed through the process of DEPOSITION; *frost is a sublimate caused by cold soaking or radiational cooling.*[74,152,195] [Dunlop, Rennie, Schaschke]

sublimation, [meteorology and chemistry] the direct change from solid phase to vapor phase without appearance of a liquid state. – See SUBLIMATE. Compare DEPOSITION.[74,152,195,203] [Dunlop, Rennie, Schaschke, SIAGDP]

submerged filling, see SUBMERGED LOADING.

submerged loading, loading a tank from the top but with a fill pipe going below the fluid level, minimizing air entrapment. – Synonym: SUBMERGED FILLING. Compare SPLASH LOADING, BOTTOM LOADING.

substantiation, **1.** [law] to establish the existence or truth of a fact, etc., by evidence which (in criminal matters) involves three concepts: relevance, admissibility and probative value. **2.** [science] the process of providing data, observations, experiments, logical reasoning, or evidence to support a hypothesis, theory, or claim. **3.** [holdover times] expression used in the early 1990's to describe the process of converting holdover times that had been put together from operational qualitative observations to holdover times put together from quantitative field and laboratory data.[41,96,120,211] [Boilard, Garner, Kuperman, TC ACAC 0027]

successive dry-out and rehydration, **1.** [thickened fluids] a test to simulate the formation of dried-out FLUID RESIDUES and for such dried-out residues to form gels upon rehydration. **2.** a PASS-FAIL TEST for Type II/III/IV fluids whose result is classified as an OPERATIONAL PROPERTY. **3.** a test sometimes named the Buehler test, after Rolf Buehler who developed the test and explained its significance. – Synonym: BUEHLER TEST.[167] [SAE AMS1428].

supercooled liquid, the state of a substance in liquid form below its freezing point. – Synonym: SUPERCOOLING. See SUPERCOOLED WATER.[127,219] [Guide, TSB]

supercooled water, also referred to as liquid supercooled water, water in liquid form at temperature below its freezing point; *water on a wing at -2 ˚C; in the absence of nucleation supercooled water droplets can exist at temperatures as low as -40 °C.*[74,127,195] [Dunlop, Guide, Schaschke]

supercooling, see SUPERCOOLED LIQUID.

superhydrophobic surface, [surface chemistry] a surface producing a static CONTACT ANGLE of $\theta > 150$ degrees and a ROLL-OFF ANGLE of less than 10 degrees.[162] [SAE AIR6232]

supersaturation, [meteorology] a state when the relative humidity of air is greater than 100%, meaning it contains more water vapor that is needed to produce SATURATION with respect to liquid water or ice. This occurs generally because there are no nuclei to assist in the PHASE TRANSITION from vapor to liquid water or ice. – See NUCLEUS.[11,74] [AMS Glossary, Dunlop]

surface boundary layer, [meteorology] the thin lowermost layer of the atmosphere in immediate contract with the ground and loosely defined as below 10 meters. – See BOUNDARY LAYER.[74] [Dunlop]

surface coating, see AIRCRAFT SURFACE COATING.

surface finish, see AIRCRAFT SURFACE COATING.

surface tension, **1.** the force that acts on the surface of a liquid, tending to minimize the surface area. This force results from intermolecular forces: a molecule in the interior of a liquid experiences interactions from other molecules equally from all sides, whereas a molecule at the surface is only affected by molecules below it in the liquid. Surface tension is measured by the CONTACT ANGLE of a drop of liquid on a surface or using the Du Nouy tensiometer which consists of a ring placed on the surface of the fluid and measuring the force required to lift it off the surface. The unit of measurement is the newtons per meter (N/m). **2.** [aircraft deicing] surface tension is related to the ability of a liquid to wet a surface. **3.** surface tension is a PHYSICAL PROPERTY that is measured for Type I/II/II/IV during initial qualification. It is a SURROGATE for wetting. It is a DETERMINE AND REPORT TEST in INITIAL QUALIFICATION and a PASS-FAIL TEST in subsequent tests. The SAE G-12 Aircraft Deicing Fluids Committee resolved to abandon this measurement as a technical requirement in AMS1424 and AMS1428 due to its redundancy with the WATER SPRAY ENDURANCE TEST which evaluates WETTING.[152,165,167,192,195] [Rennie, SAE AMS1424, SAE AMS1428, SAE G-12 ADF 20240513, Schaschke]

surrogate, [experimental sciences, aircraft deicing] a proxy measure for an attribute of true interest that is too difficult, time consuming, or costly to measure directly. Surrogacy is extensively utilized in experimental sciences. *For instance, determining the freezing point of an aircraft deicing fluid is essential for performing aircraft deicing operations. However, the standard freezing point determination method is cumbersome and time-consuming. As a result, refraction measurement with a proper calibration curve is employed both in laboratories and in the field as a surrogate for freezing point determination. Another example is using the LOWEST ON-WING VISCOSITY, as measured with a Brookfield viscometer at low shear rate, as surrogate to indicate that ANTI-ICING FLUID PERFORMANCE (comprised of WATER SPRAY ENDURANCE TIME and ENDURANCE TIMEs), and*

HOLDOVER TIMES should be within the expected range.[143,165,167,191] [O'Loughlin, SAE AMS1424, SAE AMS1428, SAE AS9968]

suspended matter, **1.** [chemical industry] solid particles that are not dissolved in a liquid but are distributed throughout it. These particles may be large enough to be visible to the naked eye, and they can be separated through processes like sedimentation or filtration. **2.** [deicing fluids] it is not an uncommon occurrence to have small amounts of particles of iron in Type I//II/II/IV fluids, often because of storage in carbon steel vessels (tanks, piping, etc.). Some fluid manufacturers set the pass-fail criterion for suspended matter in aircraft deicing fluids as "substantially free".

symmetrical deicing, the removal of contamination or the prevention against contamination with anti-icing fluids in a manner that does not differ between the two sides of the aircraft, including the WING, HORIZONTAL STABILIZER and VERTICAL STABILIZER. – Compare ASYMMETRICAL DEICING.[112,145,188,189,216] [ICAO 9640, Oda, SAE AS6285, SAE AS6286, TC TP 14052]

system, **1.** a combination of components which are inter-connected to perform one or more functions. **2.** a group of inter-dependent processes and people working together to achieve a defined result. A system comprises policies, processes and procedures. **3.** [safety science] a group of interrelated processes which are a combination of people, procedures, materials, tools, equipment, facilities, and software operating in a specific environment to perform a specific task or achieve a specific purpose, support, or mission.[92,181,182,210] [FAA SAS, SAE AS5635, SAE AS5681, TC AC SUR-002].

systemic nonconformity, a NONCONFORMITY whose extent is system-wide. – Compare LOCAL NONCONFORMITY, LIMITED NONCONFORMITY.[188] [SAE AS6285]

tactile check, **1.** process by which a person touches specific aircraft surfaces. A tactile check, under certain circumstances, may be the only way of confirming the critical surfaces of an aircraft are not contaminated. For some aircraft, tactile checks are mandatory as part of the postdeicing/anti-icing check to ensure the critical surfaces are free of frozen contaminants. **2.** [Transport Canada] see TACTILE INSPECTION.[175,188,216] [SAE ARP5660, SAE AS6285, TC TP 14052]

tactile inspection, Transport Canada term for tactile check. – See TACTILE CHECK.[216] [TC TP 14052]

tails, [aircraft components] stabilizing surfaces at the rear of the aircraft consisting of the HORIZONTAL TAIL and the VERTICAL TAIL; *"deice the wings and tails"*.[198] [Shevell]

takeoff decision speed (V_1), [aerodynamics] the speed of the aircraft beyond which the takeoff should not be aborted. – See MINIMUM CONTROL SPEED, ROTATION SPEED, MINIMUM UNSTICK SPEED, LIFTOFF SPEED, TAKEOFF SAFETY SPEED.[183,198] [SAE AS5900, Shevell]

takeoff ground roll, **1.** [aerodynamics] the portion of the takeoff procedure during which the airplane is accelerated from a standstill to an airspeed that provides sufficient lift for it to become airborne. **2.** the distance an aircraft travels on the runway from the point where the aircraft begins its ground roll until it lifts off the ground. – Synonyms: GROUND ROLL, TAKEOFF ROLL, TAKEOFF RUN.[85,198] [FAA H-8083-3C, Shevell]

takeoff roll, see TAKEOFF GROUND ROLL.

takeoff run, see TAKEOFF GROUND ROLL

takeoff safety speed (V_2), [aerodynamics] the speed of an aircraft at 35-foot altitude for civil turbine-powered aircraft (or 50-foot altitude for other aircraft) when climbing with one engine inoperative and able to maintain that speed. – See MINIMUM CONTROL SPEED, TAKEOFF DECISION SPEED, ROTATION SPEED, MINIMUM UNSTICK SPEED, LIFTOFF SPEED.[183,198] [SAE AS5900, Shevell]

tandem deicing, [aircraft deicing] the conducting of deicing operations simultaneously in both the staging and deicing bays at a deicing facility. – See STAGING BAY, DEICING BAY.[175] [SAE ARP5660]

tank truck, [chemical industry] vehicle designed to carry bulk liquids or gases whose typical capacity for liquids is 19,000–35,000 liters (5,000–9200 USG). – Compare TOTE.

taxiway, a defined path on airport land established for the taxiing of aircraft and intended to provide a link between one part of the airport and another.[216] [TC TP 14052]

temperature, **1.** a measurement of how hot or cold a substance is. **2.** a measure of the overall kinetic energy of a substance. **3.** [thermodynamics] a measure of the intensity of heat flowing in or out of a body and in which direction the heat flows. If there is no flow of heat, the bodies are at thermodynamic equilibrium. When they are not at equilibrium, heat flows spontaneously from the higher (hotter) to the lower (colder) temperature body. **4.** [temperature scales] several temperature scales can be used to quantify temperature, such as the degree Celsius, degree Fahrenheit and degree Kelvin. **5.** [meteorology] in meteorology, temperature is measured with a thermometer. – See THERMOMETER, TOTAL AIR TEMPERATURE, RAM RISE, STATIC AIR TEMPERATURE.[11,28,49,74, 152,195] [AMS Glossary, Atkins, Bureau, Dunlop, Rennie, Schaschke]

temperature buffer, see FREEZING POINT BUFFER**.**

temperature gauge, **1.** usually a device showing temperature on a numbered dial. There are several different kinds of temperature gauges, e.g., bimetallic temperature gauge, liquid filled temperature gauge, gas filled temperature gauge. **2.** [aircraft deicing] fixed temperature gauges are used to measure inline deicing fluid temperature in deicing units. – See BIMETALLIC TEMPERATURE GAUGE, LIQUID FILLED TEMPERATURE GAUGE, GAS FILLED TEMPERATURE GAUGE, THERMOMETER.[63,125] [Claus, Law]

temperature indication markers, **1.** [aircraft brakes] crayons with specified melting points used to determine brake temperatures. **2.** potential contaminants for carbon brakes.[160] [SAE AIR5490]

terminal deicing facility, a deicing facility for one or several aircraft located at or near the terminal or other location where aircraft loading activity normally takes place.[172,216] [SAE ARP4902, TC TP 14052]

theoretical oxygen demand (ThOD), [environmental science] calculated amount of oxygen to completely oxidize a compound to its final OXIDATION products. The calculation is based on the chemical formula of the compound and the STOICHIOMETRY of the oxidation reactions. – Compare BIOCHEMICAL OXYGEN DEMAND, TOTAL OXYGEN DEMAND, CHEMICAL OXYGEN DEMAND.

thermal degradation, breakdown of a material due to exposure to high temperatures. This process can result in the decomposition of the material into smaller molecules or different substances.[99] [Gorse]

thermal oxidation, OXIDATION accelerated as the result of exposure to elevated temperatures.[160] [SAE AIR5490]

thermal stability, the ability of a material, compound, or system to maintain its chemical structure, physical properties, or function when exposed to high temperatures. – See THERMAL STABILITY–ACCELERATED AGING, ACCELERATED AGING.

thermal stability–accelerated aging, [aircraft deicing fluids] a PASS-FAIL TEST designed to simulate the long-term stability of heated storage without water loss.[165,167] [SAE AMS1424, SAE AMS1428]

thermocouple, **1.** a temperature sensing element that transforms thermal energy into electrical energy. **2.** a temperature measuring device consisting of a probe in which two dissimilar metals or semi-conductors are joined together in a closed loop circuit with a second similar junction that is called the reference junction maintained at a reference temperature or that has a secondary measurement to compensate for temperature variation in the reference junction. A voltage proportional to the difference in temperature between the probe junction and the reference junction is generated. Measurement of the voltage is correlated to temperature using a CALIBRATION CURVE. – See THERMOMETER.[11,28,44,74,123,195] [AMS Glossary, Atkins, Britannica, Dunlop, Law, Schaschke]

thermometer, **1.** any instrument used to measure temperature according to a scale such as the Celsius scale. **2.** an instrument used to measure temperature based on the expansion of gas or liquid. Commonly used liquid-in-glass thermometers consist of a bulb containing a liquid such as mercury or alcohol with a dye and a long graduated capillary. As the temperature rises, the liquid expands out of the bulb and rises along the graduated scale (also known as BULB THERMOMETER). **3.** other principles of operation include the expansion of metal, bimetallic materials (used in temperature gauge), thermocouples and infrared EMISSIVITY measurement devices (infrared thermometer). See TEMPERATURE, THERMOCOUPLE, TEMPERATURE GAUGE, INFRARED THERMOMETER.[11,44,74,152] [AMS Glossary, Britannica, Dunlop, Rennie]

thickened fluid, **1.** a fluid that contains polymeric thickeners. **2.** [aircraft deicing] any AMS1428 Type II, III, or IV fluid as they contain polymeric thickeners. – Compare with UNTHICKENED FLUID. – See TYPE II, TYPE III, TYPE IV.[167,179,188] [SAE AMS1428, SAE ARP6852, SAE AS6285]

thickener, a substance that increases the viscosity of a liquid without substantially altering its other properties. Commonly used in food, cosmetics, pharmaceuticals, paints, and industrial formulations to modify texture, stability, or flow behavior. Chemically, thickeners are often high-molecular-weight polymers, such as polysaccharides (e.g., starches, gums such as xanthan gum, pectin) or proteins (e.g., gelatin, collagen) or synthetic polymers (e.g., polyacrylates). Crosslinked polyacrylates are used as thickeners in propylene glycol based Type II/III/IV fluids. – See ASSOCIATIVE THICKENER.[118,129,194] [König-Lumer, Ma, Salvador]

thin hoarfrost, **1.** [aircraft deicing] a white crystalline deposit of ice which usually develops uniformly on exposed surfaces and is so thin that surface features, such as lines and markings, can

be distinguished beneath it. **2.** on some specific aircraft, thin hoarfrost is permitted on the upper surface of the fuselage if all vents and ports are clear. – See FROST, HOARFROST.[9,39,40,188] [Airbus AMM, Boeing 737-MAX AMM, Boeing 737-NG AMM, SAE AS6285]

thrust, **1.** mechanical force generated by the engines to move the aircraft forward through the air. **2.** one of the main four forces acting upon an aircraft, the others being DRAG, LIFT, WEIGHT.[28,85,138] [Atkins, FAA H-8083-3C, NASA Thrust]

thrust reverser, [aircraft engine] a system that redirects the engine exhaust forward, helping to slow down the aircraft upon landing. It is typically located around the exhaust area and is composed of cascades, blocker doors, and other mechanisms.[85] [FAA H-8083-3C]

TKS ice protection system, commercial name for FREEZING POINT DEPRESSANT ICE PROTECTION SYSTEM.

top loading, **1.** [chemical industry] the process of loading a bulk container, such as a TANK TRUCK, tank container (tanktainer, ISOTAINER) or rail car with the same product as the previous load, without washing. **2.** [aircraft deicing] the process of loading a bulk container from the top. – Compare BOTTOM LOADING, SPLASH LOADING. – See WASH CERTIFICATE.[127] [Guide]

top offloading, [chemical industry] the process of unloading a rail car from the top, utilizing a stationary pipe (a dip leg) that extends from the lowest point of the rail car (the sump) to the top, allowing for transfer of liquids.[95] [Fishwick]

total air temperature (TAT), [in-flight parameters] the STATIC AIR TEMPERATURE plus any rise in temperature caused by the highspeed movement of the aircraft through the air. The increase in temperature is known as RAM RISE.[86] [FAA H-8083-31B]

total immersion corrosion, **1.** [material science] a type of corrosion that occurs when a material, typically a metal or alloy, is submerged in a liquid environment. The material is exposed to uniform or localized electrochemical reactions across its surface due to the surrounding liquid, leading to deterioration. The rate and type of total immersion corrosion depend on several factors, such as the chemical composition and temperature of the liquid, the material's properties, like its composition and surface finish, the presence of dissolved oxygen, salts, or other reactive substances in the liquid. Preventative measures, such as coatings, corrosion-resistant materials, or inhibitors, are commonly used to mitigate its effects. **2.** [aircraft deicing fluids, runway deicing products] a PASS-FAIL TEST classified under MATERIALS COMPATIBILITY and performed according to ASTM F483.[22,165,167,168,169] [ASTM F483, SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435]

total oxygen demand (TOD), [environmental science] a measure of the amount of oxygen to completely oxidize organic compounds in water or wastewater. It is useful for real-time monitoring of organic contamination in wastewater as it can be measured using automated online analyzers. – Compare BIOCHEMICAL OXYGEN DEMAND, CHEMICAL OXYGEN DEMAND, THEORETICAL OXYGEN DEMAND.

total plate failure, [fluid testing] a fluid testing scenario in which 100 percent of the plate has reached a VISUAL FAILURE condition. – Synonyms: COMPLETE PLATE FAILURE, ENTIRE PLATE FAILURE, FULL PLATE FAILURE.[135] [Myers]

total water content, [solid runway deicing products] a DETERMINE AND REPORT test for solid RUNWAY DEICING PRODUCTs determined in accordance with ASTM E203.[19,168] [ASTM E203, SAE AMS1431]

tote, [chemical industry] an industrial-grade container used for handling, transporting, and storing liquids with a capacity of less than 3000 liters. Common sizes include 1000 liters (approximately 275 USG) and 1200 liters (approximately 330 USG). Totes are designed for handling by forklifts or pallet jacks and feature a metal framework at the base, facilitating efficient movement and stacking. – Synonym: INTERMEDIATE BULK CONTAINER. (IBC).

trace contaminants, **1.** impurities found in small concentration. **2.** [aircraft deicing fluids] the collective expression for percentage in weight or in parts per million of sulfur, halogens, total phosphorus, nitrate, total nitrogen, lead, chromium, cadmium and mercury in the aircraft deicing fluids. **3. [**runway deicing products] the collective expression for the percentage of sulfur, halogens, total phosphate, nitrate, lead, chromium, cadmium and mercury in the RUNWAY DEICING PRODUCTs. **4.** trace contaminants are a DETERMINE AND REPORT TEST whose results are classified under ENVIRONMENTAL PROPERTY of aircraft deicing fluids and runway deicing products.[44,165,167,168,169] [Britannica, SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435.]

trailing edge, **1.** the portion of the AIRFOIL where the airflow of the upper surface rejoins the lower surface airflow. **2.** the rear edge of the airfoil.[28,85] [Atkins, FAA H-8083-3C]

transfer point, location on apron, ramp, or taxiway where responsibility for the aircraft is transferred between controlling agencies.[175] [SAE ARP5660]

transient aerodynamic effects of fluids, 1. [aerodynamics] the temporary decreasing aerodynamic effects of deicing/anti-icing during the TAKEOFF GROUND ROLL, continuing throughout ROTATION, LIFTOFF, INITIAL CLIMB, and beyond, as more and more fluid shears off the wing, thus decreasing the aerodynamic effects caused by the fluid on the wings. **2.** the transient aerodynamic effects of fluids can be evaluated in the field by aircraft manufacturers according to the protocols described in SAE ARP6852. In the laboratory these effects are assessed by performing the AERODYNAMIC ACCEPTANCE TEST on deicing/anti-icing fluids. – See FLOWOFF.[179,183] [SAE ARP6852, SAE AS5900]

transition, [aerodynamics] the process of changing from laminar to turbulent flow. – See LAMINAR FLOW, TURBULENT FLOW, REYNOLDS NUMBER. Compare PHASE TRANSITION [chemistry].[198] [Shevell]

treated surface, **1.** [aircraft surface coatings] a surface treated with an aircraft surface coating of any thickness. **2.** [aircraft deicing] a surface covered with a deicing/anti-icing fluid. **3.** [runway deicing product] a runway, apron, or taxiway treated with a RUNWAY DEICING PRODUCT. – Compare UNTREATED SURFACE.[162] [SAE AIR6232]

tribology, the study of friction, wear and lubrication between moving surfaces such as bearings and gears.[28,132,160,195] [Atkins, MW, SAE AIR5490, Schaschke]

turbulent flow, **1.** (qualitative definition) fluid (gas or liquid) flow regime characterized by disorderly fluctuating velocity and direction. **2.** in turbulent flow the motion of the particles (kinetic energy) overcome the viscous forces which tend to smooth out the flow. **3.** the transition from laminar flow to turbulent flow can be triggered by irregularities on the surface over which the particles pass over; *an irregularity (e.g., wave in a moving fluid over the surface of the wing) or roughness (e.g., frost, snow) on a wing can initiate the turbulent flow of air*. – See TRANSITION. Compare LAMINAR FLOW.[28,195,198] [Atkins, Schaschke, Shevell]

tusk out, expression used when a deicing unit PROXIMITY SENSOR is activated.[100] [GTAA 2022]

turbidity, **1.** [chemistry] a transparency reduction in an inherently transparent fluid due to light scattering by tiny suspended or trapped particles of solid, gas bubbles, or liquid droplets. **2.** [aircraft deicing fluids] an appreciation of the clarity or cloudiness of samples when verifying for APPEARANCE of Type II/III/IV fluids. **3.** [liquid runway deicing products] increase in turbidity is one of the pass-fail criterion for the storage stability test of liquid RUNWAY DEICING PRODUCTs.[28,167,169] [Atkins, SAE AMS1428, SAE AMS1435]

two-step deicing/anti-icing, a procedure to remove and protect an aircraft against precipitation in two distinct steps; the first step, deicing, is followed by the second step, anti-icing. – See FLUID COMPATIBILITY.[112] [ICAO 9640]

Type I, **1**. [aircraft deicing fluid] a fluid fulfilling the requirements of SAE AMS1424. **2.** a Type I fluid listed in the FAA and Transport Canada *Holdover Time Guidelines*. To be listed in the FAA and Transport Canada list of fluids the Type I must be qualified for aerodynamic acceptance in the HIGH SPEED RAMP TEST, MIDDLE SPEED RAMP TEST and/or LOW SPEED RAMP TEST, for ANTI-ICING PERFORMANCE and ENDURANCE TIME. **3.** Type I fluids are NEWTONIAN FLUIDs and classified as UNTHICKENED FLUIDs as they do not contain thickeners. **4.** Type I fluid as concentrate, ready-to-use or diluted. **5.** Type I as described with its concentrate/water volume ratio: *Type I (70/30)*. **6.** the freezing point depressant in Type I may be NEW GLYCOL, RECYCLED GLYCOL, or both. **7.** a fluid whose mandatory color is orange. – See RECYCLED TYPE I, CONCENTRATE. Compare TYPE I CONCENTRATE, TYPE I DILUTED. TYPE I READY-TO-USE.[165] [SAE AMS1424]

Type I concentrate, [aircraft deicing fluid] a form of Type I fluid usually containing 80, 88 or 92 percent glycol by weight and that must be diluted before use. – Compare TYPE I DILUTED, TYPE I READY-TO-USE.[165] [SAE AMS1424]

Type I diluted, **1.** [aircraft deicing fluid] a form of Type I that has been diluted. **2.** the amount of dilution is expressed as a ratio by volume of the Type I concentrate to water added by the user; *for example, Type I (75/25) means a volume ratio of 75 parts of the Type I concentrate mixed with 25 parts of water; Type I (57/43) means a volume ratio of 57 parts of the Type I concentrate mixed with 43 parts of water*. – Compare TYPE I CONCENTRATE, TYPE I READY-TO-USE,[165] [SAE AMS1424]

Type I highest operational use concentration (Type I HOUC), **1.** [aircraft deicing] the highest glycol concentration at which a Type I can be used. **2.** the Type I highest operational use glycol

concentration is usually expressed as the ratio of Type I concentrate/water by volume; *example for a mixture of 75 parts of Type I concentrate with 25 parts water by volume, the expression would be Type I (75/25)*. **3.** the Type I highest operational use concentration may also be expressed as an upper limit on refractive index or refraction in degrees Brix, see TYPE I HIGHEST OPERATIONAL USE REFRACTION (HOUR). – Compare TYPE I LOWEST OPERATIONAL USE TEMPERATURE.[127] [Guide]

Type I highest operational use refraction (Type I HOUR), **1.** the highest refraction at which a Type I can be used; *for example, the highest operational use refraction of this Type I is 42 °Brix*. **2.** an alternative way to express the TYPE I HIGHEST OPERATIONAL USE CONCENTRATION. See TYPE I LOWEST OPERATIONAL USE TEMPERATURE.[127] [Guide]

Type I lowest operational use temperature (Type I LOUT), **1.** [aircraft deicing fluids] in broad terms, the lowest operational use temperature generally means the lowest ambient temperature (a SURROGATE for the aircraft surface temperature) at which a specific fluid may be used at a given concentration for a given type of aircraft (high speed, middle speed or low speed). There are exceptions to this general definition; for instance: a) if the fluid concentration is above its highest operational use concentration, it cannot be used or b) when there is cold soaking one cannot assume that the aircraft surface temperature is equal to ambient temperature. **2.** the lowest operational use temperature needs to be determined for each specific fluid at the dilution to be used. In other words, when the specific fluid changes freezing point upon dilution or increased concentration, it may change its lowest operational use temperature. **3.** the formal definition of a Type I lowest operational use temperature is: For fluids whose glycol concentration is equal to or less than the concentration at which the AERODYNAMIC ACCEPTANCE TEST was performed (known as the HIGHEST OPERATIONAL USE CONCENTRATION), it is the higher (warmer) of a) the LOWEST AERODYNAMIC ACCEPTANCE TEMPERATURE at which the fluid meets the high speed, middle speed, or low speed AERODYNAMIC ACCEPTANCE TEST according to AS5900 for a given type of aircraft or b) the freezing point of the fluid plus the FREEZING POINT BUFFER of 10 °C (18 °F) for a Type I fluid; *for example, adding a freezing point buffer of 10 °C (about 18 °F) to Type I concentrate/water blend with a freezing point of -40 °C (-40 °F) would result in a temperature of -30 °C (-22 °F)*. **4.** the lowest operational use temperatures for Type I at fixed dilutions are published in the FAA and Transport Canada *Holdover Time Guidelines*. For other dilutions the lowest operational use temperature should be determined by users in the FIELD. **5.** in the field, to determine the Type I lowest operational use temperature, the user must ascertain: 1) the concentration at which the fluid high speed, middle speed, or low speed aerodynamic acceptance was run and provided by the fluid manufacturer as either the TYPE I HIGHEST OPERATIONAL USE CONCENTRATION (concentrate/water ratio) or the TYPE I HIGHEST OPERATIONAL USE REFRACTION (an upper limit of refractive index or refraction in °Brix) to ensure the fluid is not above the concentration tested in the aerodynamic acceptance test, 2) the applicable speed ramp for the aircraft to be sprayed, 3) the LOWEST AERODYNAMIC ACCEPTANCE TEMPERATURE for the appropriate speed ramp as provided by the fluid manufacturer, 4) the freezing point of the fluid (obtained by a refraction measurement and calibration curve–available from the fluid manufacturer) plus a freezing point buffer of 10 °C (see an example of the calculation above), and 5) outside air temperature (OAT) as a surrogate for wing temperature when there is no COLD SOAKING. **6.** when there is cold soaking, the aircraft surface temperature must be taken into consideration. **7.** the applicable ramp for a given aircraft may depend on the time to rotation and speed at rotation which are predicated on runway length and the aircraft takeoff weight; in other words, the same aircraft may be able to use data from different ramps depending on takeoff conditions. – See TYPE I, LOWEST OPERATIONAL USE TEMPERATURE, HIGH SPEED RAMP, MIDDLE

SPEED RAMP, LOW SPEED RAMP. Compare TYPE II/III/IV LOWEST OPERATIONAL USE TEMPERATURE.[188] [SAE AS6285]

Type I ready-to-use, a Type I fluid as sold by the fluid VENDOR (fluid manufacturer, licensee, or distributor) that does not require to be diluted. – Compare TYPE I CONCENTRATE, TYPE I DILUTED.[165] [SAE AMS1424]

Type II, **1.** a fluid fulfilling the Type II requirements of AMS1428. **2.** a fluid listed as a Type II in the FAA and Transport Canada *Holdover Time Guidelines*. To be listed in the FAA and Transport Canada list of fluids the Type II must a) fulfill the Type II requirements for ANTI-ICING PERFORMANCE and ENDURANCE TIME of AMS1428, b) be qualified for aerodynamic acceptance in the HIGH SPEED RAMP TEST while the MIDDLE SPEED RAMP TEST and LOW SPEED RAMP TEST are optional, and c) have been assigned a FLUID-SPECIFIC HOLDOVER TIME GUIDELINE by the regulators following the endurance time testing described in ARP5718 and ARP5485. **3.** Type II fluids are NON-NEWTONIAN PSEUDOPLASTIC FLUIDs containing thickeners and described as THICKENED FLUIDs. **4**. a fluid whose mandatory COLOR is yellow. **5.** a fluid whose water spray endurance time in the undiluted form (100/0) is at least 30 minutes and generally less than 80 minutes, and high humidity endurance time is at least 4 hours. – Compare TYPE I, TYPE III, TYPE IV. See TYPE II/III/IV.[89,167,212] [FAA HOT, SAE AMS1428, TC HOT]

Type II/III/IV, **1.** short form expression meaning Type II fluid, Type III fluid or Type IV fluid. **2**. a fluid fulfilling the requirements of SAE AMS1428. **2.** a Type II/III/IV fluid listed in the FAA and Transport Canada *Holdover Time Guidelines*. **3.** Type II/III/IV qualified in a) the undiluted (100/0) form, or b) undiluted and 75/25, or c) undiluted, 75/25 and 50/50. **4.** Type II/III/IV are qualified for at least one given type of aircraft (high speed, middle speed, or low speed). – Compare Type II/III/IV (100/0), TYPE II/III/IV (75/25), TYPE II/III/IV (50/50). See CLASSIFICATION, TYPE I, TYPE III, TYPE IV.[89,167,212] [FAA HOT, SAE AMS1428, TC HOT]

Type II/III/IV (100/0), Type II/III/IV as delivered by the manufacturer without dilution—that is 100 parts of the fluid, and no water (0 parts) added by the user. – Synonyms: TYPE II/III/IV NEAT, TYPE II/III/IV UNDILUTED.[89,167,212] [FAA HOT, SAE AMS1428, TC HOT]

Type II/III/IV (50/50), a standard dilution of Type II/III/IV with a 50/50 volume ratio of (undiluted product as delivered by the manufacturer) / (water added by the user).[89,167,212] [FAA HOT, SAE AMS1428, TC HOT]

Type II/III/IV (75/25), a standard dilution of Type II/III/IV with a 75/25 volume ratio of (undiluted product as delivered by the manufacturer) / (water added by the user).[89,167,212] [FAA HOT, SAE AMS1428, TC HOT]

Type II/III/IV lowest operational use temperature (LOUT), **1.** the higher (warmer) of: a) the lowest temperature at which a thickened fluid meets the AERODYNAMICS ACCEPTANCE TEST (AS5900) for the HIGH SPEED RAMP TEST, MIDDLE SPEED TEST and/or LOW SPEED RAMP TEST, or b) the freezing point of the fluid plus the freezing point buffer of 7 °C (about 13 °F); *for example, adding a freezing point buffer of 7 °C (about 13°F) to Type IV undiluted with a freezing point of -37 °C (-35 °F) would result in a temperature of -30 °C (-22 °F)*. **2.** the Type II/III/IV lowest operational use temperature for the high speed ramp, middle speed ramp and low speed ramp (as applicable) at

standard concentrations (100/0, 75/25, 50/50, as applicable) are published in the FAA and Transport Canada *Holdover Time Guidelines*. **3.** users of undiluted or of standard dilutions of thickened fluids, must verify the applicable Type II/III/IV lowest operational use temperature as published by the FAA and Transport Canada for, 1) the applicable concentration (100/0, 75/25, or 50/50) to ensure the correct fluid concentration is selected in the FAA/Transport Canada table, 2) the applicable speed ramp for the aircraft to be sprayed, 3) the outside air temperature (OAT) as a surrogate for wing temperature when there is no COLD SOAKING. **4.** when there is cold soaking, the aircraft surface temperature must be taken into consideration. **5.** the applicable ramp for a given aircraft may depend on the time to rotation and speed at rotation which are predicated on runway length and the aircraft takeoff weight; in other words, the same aircraft may be able to use data from different ramps depending on takeoff conditions. **6.** for non-standard dilutions of Type II/III/IV, refer to regulatory guidance. – See LOWEST OPERATIONAL USE TEMPERATURE, HIGH SPEED RAMP TEST, MIDDLE SPEED RAMP TEST, LOW SPEED RAMP TEST. Compare TYPE I LOWEST OPERATIONAL USE TEMPERATURE.[89,167,212] [FAA HOT, SAE AMS1428, TC HOT]

Type II/III/IV neat, Type II/III/IV as delivered by the manufacturer without dilution—that is no water added by the user. – Synonym: TYPE II/III/IV (100/0), TYPE II/III/IV UNDILUTED.[89,167,212] [FAA HOT, SAE AMS1428, TC HOT]

Type II/III/IV undiluted, Type II/III/IV as delivered by the manufacturer without dilution—that is no water added by the user. – Synonym: TYPE II/III/IV (100/0), TYPE II/III/IV NEAT.[89,167,212] [FAA HOT, SAE AMS1428, TC HOT]

Type III, **1.** a fluid fulfilling the Type III requirements of AMS1428. **2.** a fluid listed as a Type III in the FAA and Transport Canada *Holdover Time Guidelines*. To be listed in the FAA and Transport Canada list of fluids the Type III must a) fulfill the Type II requirements for ANTI-ICING PERFORMANCE and ENDURANCE TIME of AMS1428, b) be qualified for aerodynamic acceptance for the MIDDLE SPEED RAMP TEST and/or the LOW SPEED RAMP TEST; while the HIGH SPEED RAMP TEST is optional, and c) have been assigned a holdover time table by the regulators following the endurance time testing described in ARP5718 and ARP5485. **3.** a Type III is a NON-NEWTONIAN PSEUDOPLASTIC FLUID containing thickeners and is classified as a thickened fluid. **4**. a fluid whose mandatory COLOR is bright yellow. **5.** a fluid whose water spray endurance time in the undiluted form (100/0) is at least 20 minutes and high humidity endurance time is at least 2 hours.– Compare TYPE I, TYPE II, TYPE IV. See TYPE II/III/IV.[89,167,212] [FAA HOT, SAE AMS1428, TC HOT]

Type IV, **1.** a fluid fulfilling the requirements of the Type IV requirements of AMS1428. **2.** a fluid listed as a Type IV in the FAA and Transport Canada *Holdover Time Guidelines*. To be listed in the FAA and Transport Canada list of fluids the Type II must a) fulfill the Type IV requirements for ANTI-ICING PERFORMANCE and ENDURANCE TIME of AMS1428, b) be qualified for aerodynamic acceptance in the HIGH SPEED RAMP TEST while the MIDDLE SPEED RAMP TEST and LOW SPEED RAMP TEST are optional, and c) have been assigned a FLUID-SPECIFIC HOLDOVER TIME GUIDELINE by the regulators following the endurance time testing described in ARP5718 and ARP5485. **3.** Type IV fluids are NON-NEWTONIAN PSEUDOPLASTIC FLUIDs containing thickeners and classified as a THICKENED FLUID. **4**. a fluid whose mandatory COLOR is green. **5.** a fluid whose water spray endurance time in the undiluted form (100/0) is at least 80 minutes and high humidity endurance time is at least 6 hours. – Compare TYPE I, TYPE II, TYPE III. See TYPE II/III/IV.[89,167,212] [FAA HOT, SAE AMS1428, TC HOT]

undiluted, **1.** not diluted. **2.** [aircraft deicing] Type II/III/IV as delivered by the fluid manufacturer, without added water by the user. **3.** [aircraft deicing] for Type II/III/IV the term *undiluted* can be expressed as the volume ratio of product/water (100/0), meaning 100 parts Type II/III/IV and 0 parts water added by the user; *Type IV (100/0)*. 4. generally for Type I fluids, the term undiluted is not used, the word CONCENTRATE is preferred. – See NEAT, TYPE II/III/IV UNDILUTED, TYPE II/III/IV (100/0), TYPE II/III/IV NEAT.[188,127] [SAE AS6285, Guide]

unfailed fluid, **1.** [fluid failure] a fluid that has not been subjected to precipitation; *flight tests on unfailed fluids led to the development of the aerodynamic acceptance test criteria*. **2.** fluid subjected to precipitation that has not visually failed; *unfailed fluid remained on the wing following the takeoff test run*. – See FLUID FAILURE, FLUID FAILURE CRITERIA. Compare FAILED FLUID.[36,66,69] [Bernier, Davies, Dawson 1998]

unit qualification (UQ), [aircraft deicing fluids] process by which a fluid is qualified at a manufacturing unit. When there is only one production unit at a site, the qualification is usually called a site qualification. If there is more than one production unit at a site, each unit has to be qualified, in which case it is called a unit qualification. Compare SITE QUALIFICATION, MULTIPLE LOCATION QUALIFICATION. Synonym: PRODUCTION UNIT QUALIFICATION.[167] [SAE AMS1428]

unknown precipitation (UP), precipitation type that is reported if the automated station detects the occurrence of precipitation but the PRECIPITATION DISCRIMINATOR cannot recognize the type. This is typically due to singular or multiple precipitation types the precipitation discriminator does not recognize or precipitation occurring at the thresholds of detection for the precipitation discriminator.[142] [NOAA FMH-1]

unthickened fluid, a fluid that does not contain a thickener, e.g., Type I fluid. – Compare THICKENED FLUID.[165] [SAE AMS1424]

untreated surface, **1.** [aircraft surface coatings] a surface in its original condition from the aircraft manufacturer, or a surface that has been painted with a coating qualified by the manufacturer for use on that surface which has not been treated with an aircraft surface coating. **2.** [aircraft deicing] an aircraft surface that has not been treated with deicing/anti-icing fluids. **3.** [runway deicing product] a runway, apron, or taxiway untreated with a RUNWAY DEICING PRODUCT.[162] [SAE AIR6232]

upper sales specification viscosity limit, viscosity set by the fluid manufacturer for its sales specification. This viscosity should be equal to or lower than the SAE AMS1428 high viscosity or highest on-wing viscosity.[176] [SAE ARP5718]

upslope fog, [meteorology] fog formed when air flows upward over rising terrain and is consequently cooled by expansion to or below its DEWPOINT.[11,74] [AMS Glossary, Dunlop]

urea, 1. [chemistry] Chemical Abstract registry number 57-13-6, alternate names: carbamide; carbonyl diamide, Aquacare, Aquadrate, Basodexan, Hyanit, Keratinamin, Nutraplus, Onychomal, Pastaron, Ureaphil, Urepearl; molecular formula CH_4N_2O; mol wt 60.06; mp 132.7 °C. **2.** [runway deicing products] a freezing point depressant formerly used in the formulation of RUNWAY DEICING PRODUCTs. **3.** even though it is generally considered acceptable as a non-corrosive freezing point depressant for contact with aircraft materials, as its water solutions hydrolyze slowly to ammonium

carbonate with eventual decomposition to ammonia and carbon dioxide, it is considered detrimental when it goes into receiving water streams since ammonia is considered toxic to aquatic life. – Compare ETHYLENE GLYCOL, PROPYLENE GLYCOL. POTASSIUM ACETATE, POTASSIUM FORMATE, SODIUM ACETATE, SODIUM FORMATE.[144] [Merck Index]

validated fluid, an anti-icing fluid that can be used with the ALLOWANCE TIMEs published in the FAA and Transport Canada *Holdover Time Guidelines*. – See LIST OF VALIDATED FLUIDS.[89,212] [FAA HOT, TC HOT]

value, [metrology] [French: valeur] see QUANTITY VALUE.

value of a quantity, [metrology] [French: valeur d'une grandeur] see QUANTITY VALUE.

vanes, [aircraft engine] stationary airfoils that guide and direct the airflow within the engine. They can be found in various sections, including the compressor and turbine sections, and their purpose is to optimize the efficiency of the engine.

vendor, **1.** an organization or someone that vends or sells something. **2.** [aircraft deicing fluids, runway deicing products] term used in AMS1424, AMS1428, AMS1431 and AMS1435 for an organization selling aircraft deicing fluid or RUNWAY DEICING PRODUCTs to a purchaser. The vendor can be a FLUID MANUFACTURER, runway deicing product manufacturer, LICENSEE or DISTRIBUTOR. – Compare PURCHASER.[53,165,167,168,169] [Cambridge, SAE AMS1424, SAE AMS1428, AMS1431, SAE AMS1435]

vertical axis, [aerodynamics] an imaginary line passing vertically through the center of gravity of an aircraft. – Synonyms: Z-AXIS, YAW AXIS. – See AXES OF AN AIRCRAFT.[85] [FAA H-8083-3C]

vertical stabilizer, [aircraft components] a fixed stabilizing surface part of the VERTICAL TAIL – Synonym: FIN.[198] [Shevell]

vertical tail, [aircraft components] a stabilizing surface at the rear of the aircraft often divided into smaller parts, such as a forward fixed part called the FIN or VERTICAL STABILIZER, and a moveable control surface called the RUDDER.[198] [Shevell]

very light snow, see SNOW.

very light snow grains, see SNOW GRAINS.

very light snow pellets, see SNOW PELLETS.

virgin glycol, [aircraft deicing] a colloquial term, which may be considered inappropriate in a formal or professional setting, for NEW GLYCOL.

viscometer, an instrument to measure VISCOSITY. – Compare RHEOMETER.[31] [Barnes]

viscosity, **1.** [qualitative definition] the physical property of a fluid that characterizes its resistance to flow (a sort of internal friction). **2.** [quantitative definition] the ratio of shear stress over shear rate. **3.** [aircraft deicing] the unit of viscosity for aircraft deicing/anti-icing fluids is the millipascal

second, mPa·s. – See PHYSICAL PROPERTY, FLUID PROPERTIES, VISCOMETER, RHEOMETER, LOW SHEAR RATE VISCOSITY.[14,31,127] [Ametek Brookfield, Barnes, Guide]

visible contamination, [aircraft deicing] a visible accumulation of ice, snow, slush on an aircraft or a deicing/anti-icing fluid. – Compare CLEAR ICE.[135] [Myers]

visible moisture, **1.** any condition such as fog, rain, snow, sleet, high humidity (condensation on surfaces) and ice crystals that can produce visible moisture on aircraft and airport paved surfaces exposed to and contaminated by these conditions. **2**. visible moisture includes clouds, visibility less than one mile, rain, snow, sleet, ice crystals, mist.[112,202] [ICAO 9640, SW FOM]

visual failure, **1.** [fluid failure] a predefined level of visible frozen contamination, such as snow bridging or slush, when the contamination is no longer being absorbed by fluid and building up on the treated surfaces as precipitation continues. **2.** the mode of failure on standard test plates used to establish endurance times from which holdover times are derived. – See FLUID FAILURE, STANDARD PLATE FAILURE, DILUTION FAILURE, SNOW-BRIDGING FAILURE.[135] [Myers]

waiver, **1.** [law] voluntary relinquishment or abandonment, implied or express, of a right, claim, privilege or advantage; ordinarily to waive one must do so with knowledge of the relevant facts and with the intention of foregoing the right. **2**. [aircraft deicing fluids, runway deicing products] the approval by a purchaser of modifications to the requirements of aircraft deicing fluids or RUNWAY DEICING PRODUCTs. – Synonym: MODIFICATIONS APPROVED BY THE PURCHASER.[96,165,167,168,169] [Black's, SAE AMS1424, SAE AMS1428, SAE AMS1431, SAE AMS1435]

Waring blender, **1.** [aircraft anti-icing fluids] a laboratory instrument used to shear thickened fluid before performing anti-icing performance (water spray endurance test and high humidity endurance test) according to AMS1428. **2.** the Waring blender model 7012G was introduced in AMS1428F in July 2007 as a replacement for the BROOKFIELD COUNTER-ROTATING MIXER which was no longer manufactured by Brookfield.[166] [SAE AMS1428F]

warm front, [meteorology] any non-occluded front, which moves in such a way that warmer air replaces colder air at the surface. – See AIR MASS.[74] [Dunlop]

wash certificate, a document as evidence that a TANK TRUCK is clean, dry and odor free, stating the date, the organization that performed the wash, the location of the wash, the kind of wash, name of the tank truck carrier, and tank truck identification number. – Synonym: CLEANING CERTIFICATE. See PRIOR LOAD.

water, **1.** [chemistry] Chemical Abstract registry number 7732-18-5, molecular formula H_2O, mol wt 18.02. **2.** water in the liquid state. **3.** [runway contaminant] water in a liquid state. For purposes of condition reporting and airplane performance, water is greater than 1/8 inch (3 mm) in depth. – Compare HARD WATER.[83,144] [FAA AC150/5200-30D, Merck Index,]

water spray endurance test (WSET), **1.** a laboratory test that measures the endurance time of anti-icing fluids under conditions of light freezing precipitation (freezing fog). **2.** a laboratory test defined in AS5901. **3.** a PASS-FAIL TEST under AMS1424 and AMS1428. **4.** test used to classify Type I/II/III/IV fluids. **5.** one of the two tests that are used to evaluate fluids under the categorization ANTI-ICING PERFORMANCE. – The acronym WSET is used for both water spray

endurance test and WATER SPRAY ENDURANCE TIME. See.[121,165,167,176,178,184,216] [Laforte 1990, SAE AMS1424, SAE AMS1428, SAE ARP5718, SAE ARP6207, SAE AS5901, TC TP 14052]

water spray endurance time (WSET), the result of the water spray endurance time in minutes. – The acronym WSET is used for both water spray endurance test and water spray endurance time. See WATER SPRAY ENDURANCE TEST.

water vapor, the gaseous phase of water.[74] [Dunlop]

water vapor pressure, **1.** the partial pressure exerted by water vapor in the air. **2.** [meteorology] in meteorology, vapor pressure is used almost exclusively to denote the partial pressure of water vapor in the atmosphere.[11,219] [AMS Glossary, TSB]

weeping wing, colloquial term for FREEZING POINT DEPRESSANT ICE PROTECTION SYSTEM.

weight, **1.** the force generated by the gravitational attraction of the earth on the aircraft. Force is a vector quantity with a magnitude and a direction. For an aircraft, weight is always directed towards the center of the earth. The magnitude of this force depends on the mass of all the parts of the airplane itself, plus the amount of fuel, plus any payload on board (people, baggage, freight, etc.). The weight is distributed throughout the airplane, but we can often think of it as collected and acting through a single point called the center of gravity. In flight, the airplane rotates about the center of gravity, but the direction of the weight force always remains toward the center of the earth. **2.** one of the main four forces acting upon an aircraft, the others being DRAG, LIFT, THRUST.[28,85,139] [Atkins, FAA H-8083-3C, NASA Weight]

Wenzel state, **1.** [surface chemistry] a stable configuration of a liquid on a solid surface with complete wetting; *a well wetting fluid on a wing*. **2.** in Wenzel state the liquid fills the voids on the solid. – Compare CASSIE STATE.[162] [SAE AIR6232]

wet ice, **1.** [runway contaminant] ice that is melting or ice with any depth of water on top. **2.** a term used to describe runway, apron, or taxiway condition.[83] [FAA AC150/5200-30D]

wet runway, [runway contaminant] a runway is wet when it is neither dry, nor contaminated. For purposes of condition reporting and airplane performance, a runway can be considered wet when more than 25 percent of the runway surface area (within the reported length and the width being used) is covered by any visible dampness or water that is 1/8 inch (3 mm) or less in depth.[83] [FAA AC150/5200-30D]

wet snow, **1.** [aircraft deicing] snow which contains a great deal of liquid water. **2.** [runway contaminant] snow that has grains coated with liquid water, which bonds the mass together, but that has no excess water in the pore space. A well-compacted, solid snowball can be made, but water will not squeeze out.[83,112] [FAA AC150/5200-30D, ICAO 9640]

wetting, **1.** [surface chemistry] the ability of a liquid to spread and stay in contact with a solid. **2.** a measure of wetting is the contact angle. **3.** complete wetting is called spreading. **4.** [aircraft deicing] the ability of a deicing/anti-deicing fluid to spread and stay in contact with the aircraft surface or standard plate to be protected. **5.** [meteorology] refers to the moisture from precipitation that collects on the non-measuring components of a precipitation gauge. – Compare DEWETTING.

See ADVANCING CONTACT ANGLE, CONTACT ANGLE, WETTING FAILURE, SURFACE TENSION.[28,119,152,195] [Atkins, Krüss, Rennie, Schaschke]

wetting agent, **1.** [chemistry] a surface active agent (surfactant), that reduces SURFACE TENSION of a liquid allowing it to spread over a flat area. **2.** a surface active agent, usually added to a liquid, which reduces the tendency of a surface to repel the liquid. **3.** [aircraft deicing] a component of deicing fluids.

wetting angle, see CONTACT ANGLE.

wetting failure, **1.** [fluid failure] failure mode when a fluid fails to wet the surface it is meant to protect. Crawling, film breaks, and fisheyes are examples of wetting failure. **2.** a failure mode caused by a) the surface being HYDROPHOBIC due to hydrophobic contamination or an unsuitable coating, b) the fluid being contaminated with a hydrophobic substance, or c) for lack of an efficient WETTING AGENT in the fluid. – See FLUID FAILURE CRITERIA, CRAWLING, FISHEYES, FILM BREAKS.

white frost, see FROST.

white paper, report or guide informing readers about a complex issue, problem, or situation, and presenting potential solutions or viewpoints. White papers are often detailed and well-researched, making them valuable tools for decision-making.[44,132] [Britannica, MW]

windrow, a row of snow created by snow removal equipment during snow removal.[175] [SAE ARP5660]

wing, [aircraft components] the surface providing LIFT.[198] [Shevell]

winglet, small, nearly vertical airfoil attached to the wingtip of an aircraft to improve fuel efficiency and overall performance. The winglet blocks some of the leakage from the high pressure side to the low pressure side, reducing wingtip vortices and drag.[28] [Atkins]

wingtip, the outermost edge of an aircraft wing.

wingtip device, any modification or extension attached to the wingtip of an aircraft to improve its aerodynamic efficiency by reducing drag. Examples include WINGLETS, raked wingtips, STRAKE, and split scimitar winglets.

winter, **1**. [meteorology] the coldest season of the year. In the Northern Hemisphere, winter typically includes the months of December, January and February and in the Southern Hemisphere, winter typically includes June, July, and August. **2.** [astronomy] period between the winter solstice and the vernal equinox in the Northern Hemisphere, and the summer solstice and the autumnal equinox in the Southern Hemisphere. – See WINTER WEATHER, WINTER OPERATIONS.[11] [AMS Glossary]

winter operations, an operational period where ground icing conditions are present or could occur, and aircraft deicing/anti-icing services may be required.– See WINTER, WINTER WEATHER.[190] [SAE AS6332]

winter program manager, see PROGRAM MANAGER.

winter weather, [meteorology] encompasses various atmospheric phenomena that includes snowstorms and ice storms that can impact public safety, transportation, and infrastructure. These conditions are commonly associated with below freezing temperatures, and include snow, ice pellets, freezing drizzle, freezing rain, and combinations of these precipitation types. These conditions can occur outside of the typical winter season. – See WINTER, WINTER OPERATIONS.

yaw, **1.** [aerodynamics] rotation about the VERTICAL AXIS of the aircraft. **2.** one of the three dimensions of aircraft movement, the others being ROLL and PITCH.[85] [FAA H-8083-3C]

yaw axis, see VERTICAL AXIS.

z-axis, see VERTICAL AXIS.

zero freezing point buffer, [aircraft deicing] a condition where the difference between OUTSIDE AIR TEMPERATURE and the FREEZING POINT of the fluid is 0 °C.[127] [Guide]

zone sampler, an apparatus used to sample a tank at different depths, facilitating the obtention of representative samples. – See REPRESENTATIVE SAMPLE.[127] [Guide]

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