U.S. Department
of Transportation
Federal Aviation
Administration

Advisory Circular

Subject: DESIGN OF AIRCRAFT DEICING FACILITIES

Date: 2/5/2008 **AC No:** 150/5300-14B
Initiated by: AAS-100 **Change:**

1. PURPOSE. This advisory circular (AC) provides standards, specifications, and guidance for designing aircraft deicing facilities.

2. APPLICATION. The FAA recommends the guidelines and standards in this AC for aircraft deicing facilities. This AC does not constitute a regulation and in general is not mandatory. However, use of these guidelines is mandatory for aircraft deicing facilities funded under the Airport Improvement Program (AIP) and Passenger Facility Charge (PFC) Program. Mandatory terms such as "must" used herein apply only to those who establish aircraft deicing facilities using AIP or PFC funds.

3. CANCELLATION. This AC cancels AC 150/5300-14A, *Design of Aircraft Deicing Facilities,* dated September 18, 2007.

4. PRINCIPAL CHANGES.

a. Paragraph 3-2, Separation Standards for Off-gate Aircraft Deicing Pads, includes revised text related to a new table 3-1. The revision seeks to reduce accident/incident rates associated with ground deicing/anti-icing operations at deicing pads. The design of permanent deicing facilities calls for the inclusion of vehicle safety zones and vehicle maneuvering areas for deicing pads. The 10-foot (3 m) dimension for the width of the vehicle safety zone is the industry consensus and is recommended by the *SAE G-12, Aircraft Ground Deicing/Anti-icing Committee, Subcommittee for Design and Operations of Aircraft Ground Deicing Facilities*. In addition, National Transportation Safety Board (NTSB) "Factual Reports" support the need for this revision. Examples include NYCC06LA074 [February 25, 2006], DEN06IA034 [January 19, 2006], and DEN06IA008 [October 10, 2005]. These reports are available from the NTSB Accident Database (http://www.ntsb.gov/ntsb/).

b. New Table 3-1.

(1) Combines and updates former tables 3-1 and 3-2 to offer airport operators the option to locate off-gate deicing facilities in the movement area or non-movement areas (columns #4 and 5). Column #4, off-gate deicing facilities with vehicle safety zones, was added to allocate sufficient separation between deicing pads where the deicing facility will eventually be converted into a permanent off-gate deicing facility. Column #5, off-gate deicing facilities without vehicle safety zones, continues to reflect the practice by airport operators to designate on a temporary basis the use of apron areas, near a departure runway or adjacent to terminal gates, for deicing/anti-icing airplanes. Temporary off-gate deicing facilities may have vehicle safety zones, but they generally lack the on-site infrastructure that is associated with permanent off-gate deicing facilities, such as a snow control center, crew shelter, overhead lighting, or electronic message boards.

(2) Resolves insufficient space between vehicle maneuvering areas, vehicle safety zones, and parked airplanes that may exist for several airplane design groups when applying only taxilane criteria from AC 150/5300-13, *Airport Design*.

(3) Provides five equations, one per each of the five scenarios in the new table 3-1, that may be used for the justification of a modification of standard that provides an acceptable level of safety to the recommended separation standard. The use of an equation incurs an operational limitation on permitted wingspan for a given deicing pad.

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CHAPTER 3. DESIGN OF AIRCRAFT DEICING PADS

3-1. AIRCRAFT DEICING PADS. The size of an aircraft deicing pad is determined by the aircraft parking area and the maneuvering area for mobile deicing vehicles as shown in figure 1-1.

a. Aircraft Parking Area. This area is the inner area used for parking aircraft to receive deicing/anti-icing treatment.

(1) Width. The width of the parking area equals the upper wingspan of the most demanding airplane design group (ADG) using the deicing pad.

(2) Length. The length of the parking area equals the fuselage length of the most demanding aircraft using the deicing pad.

b. Maneuvering Area for Mobile Deicing Vehicles. This outer area provides the "vehicle lane width" necessary for two or more mobile deicing vehicles to satisfactorily perform simultaneous and complete left- and right-side uniform fluid distribution techniques for removing deposits of frost, ice, slush, and snow from aircraft surfaces and for anti-icing operations. The vehicle lane width must be 12.5 feet (3.8 m) and be mutually exclusive of any adjacent deicing pad. As noted by SAE ARP 4737, *"Dual vehicle fluid applications help in eliminating potential aerodynamic problems resulting from fluid applications by a single mobile deicing vehicle."*

3-2. SEPARATION STANDARDS FOR OFF-GATE AIRCRAFT DEICING PADS. Aircraft deicing pads for off-gate facilities will have parallel taxiway centerlines. Separation criteria provided in table 3-1 takes into account the need for individual deicing pads to provide sufficient maneuvering area around the aircraft to allow simultaneous treatment by two or more mobile deicing vehicles (see paragraph 1-2(d)(2) and figure 1-1) and, with the exception of column #5 of table 3-1, sufficient non-overlapping space for a vehicle safety zone (VSZ) between adjacent deicing pads (see paragraph 3-4(d)) and for outer deicing pads. Thus a permanent deicing facility with three deicing pads will have six vehicles maneuvering areas (VMAs) and four VSZs. Table 3-1 observes taxiway centerline to fixed or movable object criteria because VSZs house fixed and movable objects. Furthermore, table 3-1 entries and footnotes ensure that sufficient separation exists between taxi centerlines and VSZs for VMAs. Table 3-1 offers airport operators the option to locate permanent off-gate deicing facilities in the movement or non-movement areas. Column #5, off-gate deicing facilities without vehicle safety zones, reflects the practice by airport operators to designate on a temporary basis the use of suitable apron areas, near a departure runway or adjacent to terminal gates, for deicing/anti-icing airplanes. Temporary off-gate deicing facilities may have vehicle safety zones, but they generally lack the infrastructure that is associated with permanent off-gate deicing facilities, such as a snow control center with a crew shelter, overhead lighting, and possibly electronic message boards.

3-3. FIXED-FLUID APPLICATORS. Fixed-fluid applicators should satisfactorily perform simultaneous and complete left- and right-side uniform fluid distribution techniques for removing deposits of frost, ice, slush, and snow from aircraft surfaces and for anti-icing operations. Fixed-fluid applicators, such as gantries or telescopic booms, can have the advantage of reducing vehicle traffic and lowering the quantities of fluid used. Though fixed-fluid applicators may be the primary deicing applicators for a deicing pad, the pad must have enough maneuvering area for mobile deicing vehicles to provide secondary backup capabilities in case of primary equipment failures.

3-4. PAVEMENT SURFACE MARKINGS FOR OFF-GATE DEICING FACILITIES.

a. Taxiway Centerline Surface Markings. Off-gate deicing facilities will have taxiway centerline surface markings for entering a deicing pad, moving through the deicing pad, and exiting the facility. The surface marking must be in accordance with AC 150/5340-1, *Standards for Airport Markings.* At airports operating below 1,200 feet runway visual range (RVR), deicing facilities located on a designated SMGCS low-visibility taxi route (see AC 120-57, *Surface Movement Guidance and Control System (SMGCS))* may require additional taxiing route surface marking, lighting, and sign systems necessary to support SMGCS operations.

b. Facility Boundary Surface Marking. Off-gate deicing facilities must have a taxiway/taxiway holding position surface marking to indicate the entrance and exit boundary of the facility (figure 2-1). The surface marking, which serves two functions, must be in accordance with paragraph 3-4(b)(1) and (b)(2). This marking reduces incursions by deicing crews and aircraft into the object free area of the connecting taxiway during nighttime or low-visibility conditions. Also, it identifies the ground control transfer points between the ATCT and

facility control. Lighted signage may be used instead of surface markings only at the facility entrance. If lighted signs are used, they must be in accordance with AC 150/5340-18, *Standards for Airport Sign Systems*.

(1) Surface Marking. The taxiway/taxiway holding position surface marking (perimeter of the facility) must be marked in accordance with AC 150/5340-1 (see figure 3-1(a)).

Airplane Design Group[2] (ADG)	*Off-Gate Aircraft Deicing Facilities*				
	Non-Movement Area[1]		*Movement Area[1]*		
	Column #1[3] *Outer Deicing Pad* *Taxi Centerline (CL) to Edge of Vehicle Safety Zone (VSZ)*	*Column #2[3]* *Interior Deicing Pads* *Taxi CL to Taxi CL*	*Column #3[3]* *Outer Deicing Pad* *Taxi CL to Edge of VSZ*	*Column #4[3]* *Interior Deicing Pads* *Taxi CL to Taxi CL*	*Column #5[4]* *Temporary Deicing Pads* *Taxi CL to Taxi CL*
	Includes 1 Vehicle Maneuvering Area (VMA)	*Includes 2 VMAs + 1 VSZ*	*Includes 1 VMA*	*Includes 2 VMAs + 1 VSZ*	*Includes VMAs and no VSZ*
ADG VI	*167 ft (51 m)*	*344 ft (105 m)*	*193 ft (59 m)*	*396 ft (120.5 m)*	*324 ft (99 m)*
ADG V	*138 ft (42 m)*	*286 ft (87 m)*	*160 ft (48.5 m)*	*330 ft (100.5)*	*267 ft (81 m)*
ADG IV	*112.5 ft (34 m)*	*235 ft (71.5 m)*	*129.5 ft (39.5 m)*	*269 ft (82 m)*	*215 ft (65.5 m)*
ADG III	*81 ft (24.5 m)*	*172 ft (52.5 m)*	*93 ft (28.5 m)*	*196 ft (59.5 m)*	*152 ft (46.5 m)*
ADG II	*57.5 ft (17.5 m)*	*125 ft (38 m)*	*65.5 ft (20 m)*	*141 ft (43 m)*	*105 ft (32 m)*
ADG I	*39.5 ft (12 m)*	*89 ft (27 m)*	*44.5 ft (13.5 m)*	*99 ft (30 m)*	*74 ft (22.5 m)*

The values obtained from the following equations may be used to show that a modification of standard will provide an acceptable level of safety. Refer to paragraph 6 of AC 150/5300-13 for guidance on modification of standard requirements.

Column No. 1: Taxilane CL to fixed or movable object equals 0.6 times airplane wingspan (WS) plus 10 feet - [(0.6)(WS) + 10] for all ADGs.
Column No. 2: Taxilane CL to parallel taxilane CL with fixed or movable object equals [(1.2)(WS) + 30] for all ADGs, plus with ADG I, wingspans less than 25 feet require sufficient separation for two VMAs and one VSZ.
Column No. 3: Taxiway CL to fixed or movable object equals [(0.7)(WS) + 10] for all ADGs.
Column No. 4: Taxiway CL to parallel taxiway CL with fixed or movable object equals [(1.4)(WS) + 30] for all ADGs, plus with ADG I, wingspans less than 15 feet require sufficient separation for two VMAs and one VSZ.
Column No. 5: Taxiway CL to parallel taxiway CL equals [(1.2)(WS) + 10] for ADGs III – VI. Apply the same equation for ADGs I and II, but wingspans less than 75 feet require sufficient separation for two VMAs and no VSZ.

Note 1: Facilities built in non-movement areas are not under direct ATCT control. Facilities built in movement areas are under direct ATCT control.
Note 2: ADGs are defined in AC 150/5300-13, paragraph 2. Table 3-1 values assume largest airplane wingspan within each ADG.
Note 3: Columns #1 – 4 have a 12.5-foot (3.8-m) wide VMAs and a 10-foot (3-m) wide VSZ.
Note 4: Column #5 has 12.5-foot (3.8-m) wide VMA and no VSZ.

Table 3-1. Separation criteria for off-gate aircraft deicing pads having parallel taxiways

c. Exiting Jet Blast.

(1) Exiting Aircraft. The deicing pad layout should account for jet blast effects caused by exiting aircraft on other aircraft that are receiving or have completed deicing/anti-icing treatment and on personnel and equipment performing duties. Jet blast velocities on neighboring aircraft can cause a degradation of the protective film coating of Type II fluids, leading to reduced holdover times. Reduced holdover protection also results when taxiing aircraft recirculate snow onto following aircraft when trailing separations are short. As AEA states, *"Sufficient distance from the preceding aircraft must be maintained as blowing snow or jet blasts can degrade the anti-icing protection of the aircraft"*. AC 20-117, *Hazards Following Ground Deicing and Ground Operations Conducive to Aircraft Icing*, further warns that in addition to the degradation effects of anti-icing protection, *"Be aware that operations in close proximity to other aircraft can induce snow, other ice particles, or moisture to be blown onto critical aircraft components, or allow dry snow to melt and refreeze"*. Aircraft manufacturers are the primary source for jet blast pressures and velocity curves.

(2) Mitigation Measures. Mitigation measures may be necessary at deicing facilities to ensure jet blast does not damage parked ground service equipment required at the facility, personnel shelter, and FAA navigational facilities. AC 150/5300-13 describes means of minimizing the effects of jet blast.

3-6. ELECTRONIC MESSAGE BOARDS FOR OFF-GATE DEICING FACILITIES. The use of electronic message boards (EMBs) at off-gate deicing facilities by the service provider (not ATCT) have increased the overall efficiency of deicing/anti-icing aircraft and, additionally, improved the transfer of information between flight crews and service providers. In general, the primary purpose for installing EMBs is to (1) reduce verbal communication between all involved parties; [*caution – radio communication is still necessary to inform flight crews when to exit the deicing pad*]; (2) provide flight crews with clear, concise information; (3) improve deicing pad operational safety and efficiency; and (4) reduce ground congestion by removing personnel and equipment from the deicing pad area after completing deicing/anti-icing operations. If EMBs are installed, they should be installed in accordance with SAE AS 5635, *Message Boards (Deicing Facilities)*. The SAE aerospace standard defines the minimum content and appearance of the electronic display, functional capabilities, design requirements, and inspection and testing requirements for EMBs. One acceptable location for EMBs is within the vehicle safety zones discussed in paragraph 3-4(d). Figures 3-5(a) through (c) illustrate the types of information exhibited by EMBs at Toronto Pearson International Airport, Toronto, Canada, and Montreal Pierre Elliot Trudeau International Airport, Montreal, Canada.

3-7. APRON DESIGNS FOR OFF-GATE DEICING FACILITIES. Aprons for deicing facilities must have a pavement design that supports the anticipated aircraft loads and directs deicing fluid for collection.

a. Pavement Designs. The pavement must be either a rigid (concrete) or flexible (asphalt) pavement and designed in accordance with AC 150/5320-6, *Airport Pavement Design and Evaluation,* and AC 150/5320-12, *Measurement, Construction, and Maintenance of Skid Resistant Airport Pavement Surfaces*. Deicing pads should be grooved to assist in channeling deicing fluids for collection and providing aircraft and personnel better traction.

b. Apron Grades and Surface Gradients. Apron grades and adjacent surface gradients must be in accordance with AC 150/5300-13. Apron areas should direct flows away from deicing pad centerlines, fixed-fluid applicators, vehicle safety zones, and crew shelter. If interior covered drains are used, they must not create a hazard to aircraft and personnel. AC 150/5320-5 provides guidance on high-strength covers.

c. Limit of Apron Perimeter. The perimeter of the facility's apron must extend such that no aircraft surface being deiced/anti-iced extends beyond it, and it will have a means for collecting or redirecting deicing fluid runoff. One alternative is a trench drainage system. Regardless of the collection alternative, it must not in itself become a hazard to taxiing aircraft or personnel.

Figure 3-5(a). Electronic message board instructing the pilot to continue forward to the stop point of the deicing pad

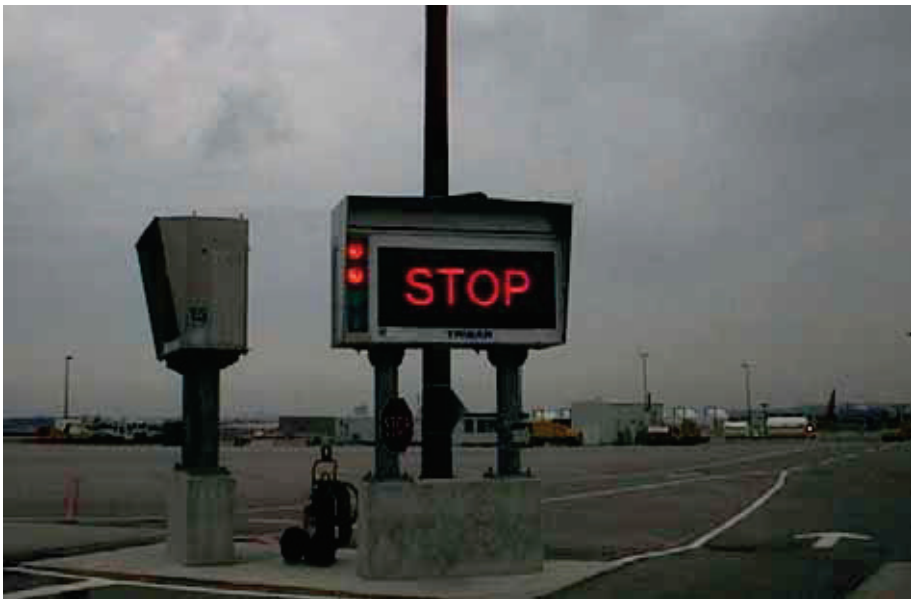

Figure 3-5(b). Electronic message board informing the pilot the aircraft has reached the stop point of the deicing pad