SAE Aerospace
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AEROSPACE STANDARD

SAE AS5635

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Message Boards
(Deicing Facilities)

FOREWORD

A visual message display system is intended to improve deicing facility safety and operations management including administrative and record keeping functions.

The Message Boards at a Deicing Facility are the display elements of such a system that includes display of aircraft movement monitoring, deicing facility control and records, and possibly deicing truck location and deicing operation performance.

The intent of a Message Board display at a Deicing Facility is to enhance communication and information to the pilot related to deicing operations.

Direct interface with the pilot comprises display of:

Aircraft lead-in to the deicing pad bay,
Lead-out from the deicing pad bay, and
Pertinent de/anti-icing process information.

This standard covers the Message Boards for Deicing Facilities.

Reference to the overall Central Deicing Facility management system is made to provide an appropriate context.

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1. SCOPE:

This SAE Aerospace Standard (AS) establishes the minimum standard requirements for Message Boards (MBs) at Deicing Facilities. This standard also defines the minimum content and appearance of the display, functional capabilities, design requirements, and inspection and testing requirements.

The Design and Operation of Aircraft Deicing Facilities are covered by ARP4902.

Standards for the deicing facility management system are outside the scope of this document.

1.1 Equipment Classification:

The MB system may incorporate additional features not addressed in this standard (such as the ability to display quantity of de/anti-icing fluids used). The incorporation of such additional features, not considered essential for system functioning, shall not compromise the system's intended purpose.

1.2 Field of Application:

1.2.1 Applicable Airplanes: The MB system is applicable to all classes of aircraft using civil deicing facilities.

1.2.2 Applicable Airports: The message board system shall be compatible with airport ground operations operating under ICAO Standards.

1.3 System Elements:

1.3.1 Message Boards: MBs display variable information based on an interface with the Deicing Facility control station including information on aircraft guidance and positioning.

1.3.2 MB Controls: Control of the Message Boards can be either manual, and/or automatically operated through third party detection devices (e.g., aircraft location sensing devices). The system may be further enhanced by interfacing with Apron Control software, and Airline operation system databases, including information resource management, data archiving, retrieval and reporting.

1.3.3 Alternative Applications for MBs: MB technologies may have alternative applications for airport operations (e.g., aircraft/vehicle movement instruction/information).

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2. REFERENCES:

2.1 Applicable Documents:

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

2.1.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

ARP4902	Design and Operation of Aircraft Deicing Facilities
ARP4737	Aircraft Deicing/Anti-icing Methods

2.1.2 MB Manufacturers and Operators Documentation: Available from vendors and operators.

Installation, operation, maintenance and training manuals

2.1.3 RTCA Publications: Available from RTCA, Inc., 1828 L Street, NW, Suite 805, Washington, DC 20036.

DO-216	General Specifications for Ground-Based Equipment

2.1.4 Aviation Regulations: The applicable parts of the following documents shall be adhered to as they apply:

Title 14 of the Code of Federal Regulations (US Code of Federal Aviation Regulations), Joint Aviation Authorities regulations (JARs), and Transport Canada Civil Aviation Regulations (CARs) and Standards.

JAA/FAA Requirements, Regulations:

JAR-1	Definitions and Abbreviations
JAR TSO	Joint Technical Standard Orders

FAA Aircraft Icing Handbook

Transport Canada Regulations and Standards:

TC-CASS 622.11	Commercial Air Service Standard - Ground Icing Operations Standard

TP312 (to be re-issued as TP322) Aerodrome Standards and Recommended Practices

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2.1.5 ICAO Documents: Available from ICAO, Document Sales Unit, 999 University Street, Montreal, Quebec H3C 5H7 Canada.

'Aerodromes' Annex 14 to the Convention on International Civil Aviation

Volume 1 - Aerodrome Design and Operations

2.2 Definitions:

ANTI-ICING: A precautionary procedure that provides protection of an airplane against the formation of frost or ice and accumulation of snow or slush on treated surfaces of the airplane for a limited period of time.

DEICING: A procedure by which frost, ice, snow or slush is removed from the airplane in order to provide clean surfaces.

ICEHOUSE: The building housing the control center (and possibly vehicle garaging, fluid storage and personnel facilities) at the deicing facility.

nit(s): Unit of luminance: 1 candela/m^2

SYSTEM: A combination of components which are inter-connected to perform one or more functions.

2.3 Abbreviations:

AC: Advisory Circular

AMJ: Advisory Material Joint (JAA)

AS: Aerospace Standard

CEN: Comité Européen de Normalisation. European Committee for Standardisation. Europäisches Komitee für Normung

CFR: Code of Federal Regulations (USA)

EN: Norme Européenne . European Standard. Europäische Norm.

EUROCAE: The European Organisation for Civil Aviation Equipment

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2.3 (Continued):

FAA: Federal Aviation Administration (USA)

FPD: Freezing Point Depressant; used to qualify the nature of fluids

IEC: International Electricity Committee

JAA: Joint Aviation Authorities (in Europe)

JAR: Joint Aviation Requirements (Europe)

MB: Message Board

Min: Minute

MOPS: Minimum Operational Performance Specification

MTBF: Mean Time Between Failures

OAT: Outside Air Temperature

SAE: Society of Automotive Engineers (USA originated)

T.C: Transport Canada (The Canadian Civil Aviation Authority)

3. GENERAL DESIGN REQUIREMENTS:

3.1 Introduction:

This chapter identifies general design requirements for MBs at Deicing Facilities.

The Deicing Facility Control System may include, but is not limited to, the following elements:

Deicing Facility control (Icehouse) Workstation
Aircraft Movement Detection and Guidance Display
Addressable/Electronic Message Boards (AMB/EMB)
Power supplies and transmission
Data Links (aircraft, deicing equipment, ACARS)
Computerized management of deicing operations
Control and direction of aircraft movements
Apron control (aircraft, deicing vehicles and equipment, snow removal equipment)
Airline Databases

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3.1 (Continued):

Data Recording:
- Aircraft identification
- Aircraft movements, including timestamp
- Deicing operations including fluid utilization and recovery
- Time and weather
- Archiving and data recovery
- De/anti-icing fluid inventory

When locating MBs, consideration should be given to the deicing facility layout and space available.

The MB may include, but is not limited to, display of variable messages including:

Control and direction of aircraft movements
Pad identification
Airline and/or aircraft identification
Instructions (Slow, Stop, Hold, Exit, and directional arrows/chevrons)
Relevant radio frequencies
Deicing information (OAT, Fluid Type, Final fluid application Start time)

3.2 Purpose:

The primary purpose of MBs is to enhance aviation safety by:

reducing verbal communication,
providing pilots with clear concise information,
improving operational efficiency, and
reducing congestion by removing personnel and equipment from the deicing area.

The MBs shall comply with applicable FAA/JAA/TC operation regulations and/or standards, and shall provide information to the flight crew regarding any movement/information instruction.

3.3 Technical Requirements:

Design, supply and installation of MB shall be in accordance with current regulations, applicable standards and generally accepted good engineering practices.

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3.3.1 Design and Selection of Materials: MB parts exposed to the external environment shall be designed to withstand the temperature, pressure, chemical and/or radiation environment associated with deicing/anti-icing conditions. MB parts exposed to the external environment shall be designed to withstand impact from deicing fluids; and slush and ice particles shed from an airplane and remain functional.

Materials shall be of a quality that experience and/or tests have demonstrated to be suitable and dependable.

3.3.2 Workmanship: Workmanship shall be such as to minimize degradation of service performance and reliability. All components shall be fitted properly and firmly in their appropriate positions. All electrical connections shall be mechanically secured and electrically sound. Care shall be given to neatness and thoroughness of soldering, wiring, welding, brazing, surface treatments, painting, screwed and bolted assemblies, marking of parts and assemblies, and elimination of burrs and sharp edges.

3.3.3 Electrical Bonding and Grounding: The MB grounding system shall provide for separation of AC (Alternating Current) power, DC (Direct Current) power, chassis ground and signal ground(s).

On non-conductive enclosures, controls or metal parts that may be touched shall be bonded to ground. Case ground shall not be used for electrical power returns. Materials, surface preparation and finishes for electric bonding surfaces shall be compatible with preservation of adequate electrical conductivity over the life of the Message Board. The maximum resistance across any bonding or grounding junction shall be 1.0 Ω or less, as manufactured.

3.3.4 Manufacturer Identification: Manufacturer identification information shall not be conspicuous on the exterior of MBs.

3.3.5 Operation: Operation of the MBs at deicing facilities shall be consistent with the principles of the procedures required by ARP4902 paragraph 6.4 and ARP4737 Section 10.

MBs may be mobile or fixed.

3.4 Facility Considerations:

MBs shall consider the applicable requirements of ARP4902 Section 4 and paragraphs 4.2.6.5 and 4.3.

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3.4.1 Deicing Pad Layout: Consideration should be given to the following information when locating MBs:

Deicing pad layout may involve one or more parallel deicing bays with individual entries from the access taxiway and exits to the departure taxi route respectively. A unique identification number distinguishes each bay.

Layout may also involve direct entry of aircraft from the entry taxi-way to the deicing bay, or may involve aircraft entry to an area used as a staging bay for 'hold' pending aircraft transfer to a second bay where deicing is performed.

3.4.2 Pad Lead-In and Exit Identification: MB displays to pilots shall be compatible with Verbal instructions

In-ground lighting on the taxiway-to-assigned bay lead-in line, or side-of taxiway indicators may be linked to the message board display. Lead-in signage applicable to the bay to be used, only, shall be illuminated so as to provide the approaching aircraft with a unique indication as to which bay to enter.

The MB at the assigned bay shall display the aircraft identification/flight number and bay number to provide confirmation to the pilot.

Clear exit instructions, and exit directions will be provided verbally and may be indicated by the message board.

3.4.3 Message Displays: In the event of conflict, verbal communication shall take precedence over visual displays.

3.4.3.1 Aircraft Entry to Pad: (See Figure 1)

Verbal entry instructions will be provided. The MB must display pad number, aircraft identification/flight number, and may provide a visual cue to proceed and stop at the red bar.

3.4.3.2 Positioning of Aircraft on the Pad: (See Figure 2)

The MB display associated with the aircraft position sensing system shall be programmed to indicate red (stop) or green (go). When the aircraft is in the required position, a visual text "STOP" and signal light/bar display are mandatory.

Symbolic chevrons or word indications "SLOW" may also be used prior to the "STOP".

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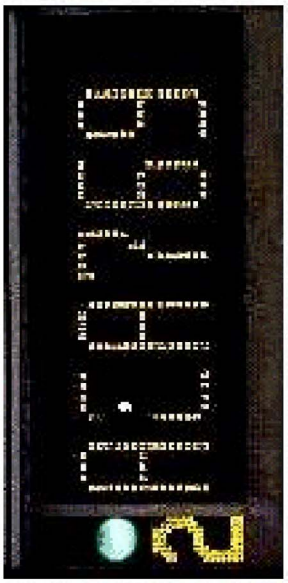

Sample 'B'

Left area:
Green 'GO', Pad Identification
Right Area – Information Display:
Flight Number

Sample 'A'

Left area:
Green 'GO'
Right Area – Information Display:
Flight Number, and Pad

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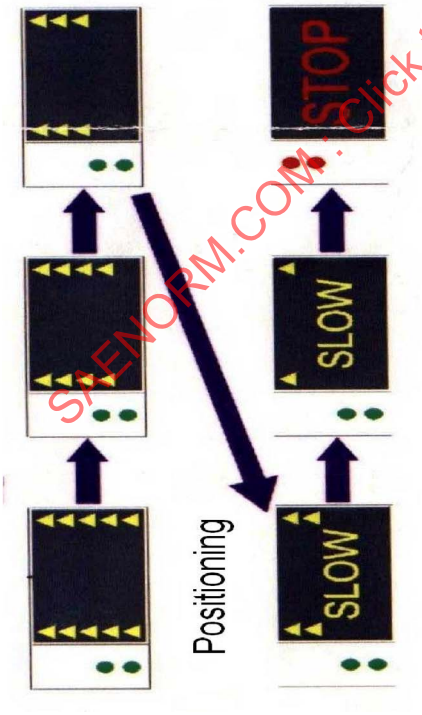
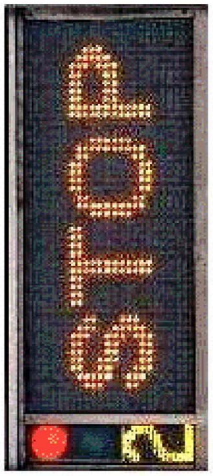
FIGURE 1 - Sample Information Displays: Aircraft Entry to Pad



Sample 'A'

Left area:
Green 'GO', Changing to Red 'Stop'

Right Area – Information Display:
Symbolic Chevrons; "Slow or "stop"



Sample 'B'

Left Area:
Light changes to 'Red' for 'Stop';
Pad Identification

Right Area – Information Display:
Visual Display "STOP"
(When a/c reaches *stop* bar)

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FIGURE 2 - Sample Information Displays: Aircraft Positioning

3.4.3.3 De/Anti-icing Information to Flight Crew: (See Figures 3 and 4)

Instructions and information will be provided to the flight crew pertinent to deicing in accordance with ARP4737, and may be displayed on the MBs.

Radio frequencies will be provided and may be displayed on the MBs before and/or after de/anti-icing.

3.4.3.4 Aircraft Exit from Deicing Bay: (See Figure 5)

After confirmation that all deicing equipment is clear of the aircraft, verbal exit instructions to pilots will be provided. Visual signals such as the word "Exit" or an arrow indicating direction may be displayed on the MBs accompanied by a green signal light.

3.4.4 Dissemination of MB Information: Information displayed on Message Boards shall be made available for inclusion in appropriate user publications concerning deicing facilities, where applicable.

3.5 Minimum Design Requirements:

3.5.1 Components: Standard components and Equipment, and Commercially Off The Shelf (COTS) items shall be used wherever possible.

3.5.2 MB Location on Pad: MBs shall be located outside of aircraft movement areas either ahead of the pad center-line or at side of deicing pad within the pilot's field of view.

3.5.3 Message Board Geometry: Recommended minimum MB Display Dimensions:

Overall Face Height: 0.8 m
Overall Face Width: 1.6 m
Support Column height: as applicable

3.5.4 Messaging Capabilities:

a. The display shall have the capability to present alpha-numeric and pictorial messages.

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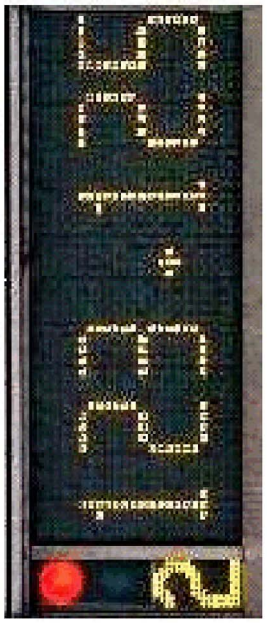
Sample 'A'

Left area:
Red 'Stop'

Right Area – Information Display:
Pad Control Radio Frequency



Sample 'B'

Left area:
Red 'Stop', Pad Identification

Right Area – Information Display:
Pad Control Radio Frequency

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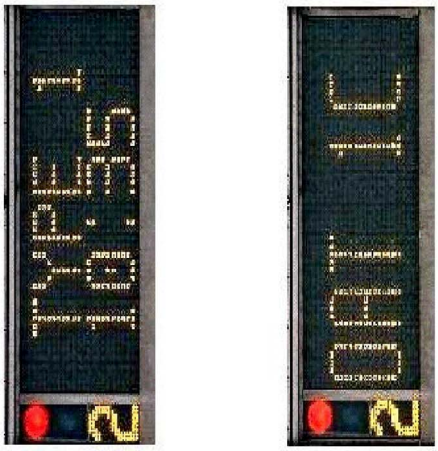
FIGURE 3 - Sample Information Displays: Radio Frequency (Display when a/c stops)



Sample 'B'

Left area:
Red 'Stop', Pad Identification

Right Area – Information Display:
Fluid; Time (Start of Deicing)
[Repeat for Anti-icing, if req'd]
***alternating with* -**
Ambient Temperature

Sample 'A'

Left area:
Red 'Stop'

Right Area – Information Display:
Maintain "Stop".
Deicing Information given Verbally

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FIGURE 4 - Sample Information Displays: Deicing Information