SAE The Engineering Society For Advancing Mobility Land Sea Air and Space®
INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE RECOMMENDED PRACTICE

SAE ARP5141

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Chassis Mounted Lifts Used to Board Airline Passengers With Mobility Impairments

1. SCOPE:

This SAE Aerospace Recommended Practice (ARP) is intended to recommend a minimum standard, for the design and manufacturer of a self-propelled, chassis mounted passenger boarding vehicle. The vehicle will permit safe operation while minimizing aircraft damage and personnel safety hazards associated with commercial aircraft boarding operations.

The vehicle described is intended to be used for assisting wheelchair passengers and passengers with disabilities on and off aircraft with door sill heights of 60 in (152.4 cm) and above.

2. 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 unless a specific exemption has been obtained.

2.1 SAE Publications:

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

ARP1247	General Requirements for Aerospace Ground Equipment, Motorized and Non-Motorized
ARP1328	Aircraft Ground Support Equipment Vehicle Stability Analysis
AIR1375	Minimum Safety Requirements for Special Purpose Airline Ground Support Equipment
AIR1558	Interface Protection Devices-Ground Support Equipment to Aircraft
ARP1838	Pictograms for Ground Support Equipment
AS4828	Technical Manual Development for GSE
SAE Handbook - Latest revision	

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SAE WEB ADDRESS: http://www.sae.org

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2.2 ISO Publications:

Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002.

ISO 6966	Aircraft - Basic Requirements for Aircraft Loading Equipment
ISO 7000	Graphical Symbols for Use on Equipment
ISO 7718	Airport Equipment - Passenger Loading Bridge or Transfer Vehicle Requirements for Interface With Aircraft Doors
ISO 11995	Aircraft-Stability Requirements for Loading and Servicing Equipment
ISO DIS 15845	Ground Equipment - Boarding Equipment for Disabled Passengers - Functional Requirements

2.3 FAA Publications:

Available from Federal Aviation Administration, 800 Independence Avenue, SW, Washington, DC 20591.

FAA AC150/5220-21	Guide Specification for lifts Used to Board Airlines Passengers With Mobility Impairments

2.4 OSHA Publications:

Available from OSHA, 200 Constitution Avenue, NW, Washington, DC 20210.

OSHA Safety and Health Standards 29 CFR 1910

2.5 IATA Publications:

Available from International Air Transport Association, IATA Building, 2000 Peel Street, Montreal Quebec, Canada H3A 2R4.

IATA AHM 921	Functional Specification for Incapacitated Passenger Loading Vehicle

2.6 Other Publications:

Measure of Man, Human Factors in Design, H. D. Dreyfus

Division of Industrial Safety and Industrial Safety Codes Application in the State of Manufacture

3. GENERAL REQUIREMENTS:

3.1 Configuration:

The vehicle shall consist of a van body with lift system and stabilizers mounted on a commercial or special chassis in which the passenger and attendant is transported between aircraft on the ramp or between aircraft and terminal building. The front of the unit shall have a platform for passenger transfer between aircraft and van body. If the van floor does not go to ground level, there shall be a lift platform mounted to the rear of the van. This lift shall bridge the height from ground level to van body.

An operator's cab shall be provided which may be permanently attached to the front of the van body or it may be separated from the van body.

3.2 Operational Environment:

The unit shall not be adversely effected by wind, sand, rain, grit, snow, ice, deicing fluids, and other normally encountered airport ramp conditions. The entire unit shall operate satisfactorily under temperature ranges from -40 °F (-40 °C) to +140 °F (+60 °C) with provisions for greater temperature variations.

4. FUNCTIONAL AND DESIGN REQUIREMENTS:

4.1 The unit must be capable of the following:

4.1.1 Ground Level: Transporting passengers and attendants between ground level and the van body.

4.1.2 Transport: Transporting passengers and attendants between aircraft on the ramp, and between aircraft and the terminal buildings at a safe speed.

4.1.3 Elevating: Elevating passengers and attendants to aircraft with door sill heights between 55 in (140 cm) to 228 in (579 cm) in safely while meeting requirements of SAE, IATA, and ISO documents.

4.1.4 Transfer: Transferring passengers between the aircraft and van.

4.1.5 Protection: Protecting passengers and attendants from injury, including personnel seat belts.

4.1.6 Ramp Drive Speed: Being driven between airport gates and terminal and a maximum allowable safe speed. While elevated and approaching the aircraft the unit must be restricted to a speed that is safe for the aircraft, 1.5 mph (2.4 km) to 3 mph (4.8 km) maximum.

4.2 Design Standards:

4.2.1 Capacity: The van shall have a minimum work load capacity of 2000 lb (907 kg). The platform shall have a minimum capacity of 500 lb (226.8 kg) evenly distributed over any 1/4 of its area.

4.2.2 Non-Skid: All surfaces shall be non-skid type.

4.2.3 Forward Platform: Must be designed to minimize aircraft damage. Its leading edge is to be equipped with a full width non-marking rubber bumper.

4.2.4 Railings: The platform shall be equipped with protective railings that are adjustable in length to bridge the gap between the fixed portion of the railings and the different aircraft being served by the truck. The adjustable portion of the railings is to have a non-marking rubber bumper to protect the aircraft.

4.2.5 Stabilizers: If the vehicle requires stabilizers to meet the requirements of this specification, they shall:

4.2.5.1 Be fully retracted when the vehicle is moving.

4.2.5.2 Be required to be deployed when the van floor height reaches a point where the vehicle will not meet the wind and jet blast requirements of this specification.

4.2.5.3 Not be capable of being retracted until the elevated van floor height is down to a point where the vehicle will meet the wind and jet blast requirements of this specification.

4.2.5.4 Be capable of being retracted with the van body at any height under emergency conditions.

4.2.5.5 Shall not collapse in the event of loss of electric or hydraulic power.

4.2.6 Van Body: A van body shall be equipped with the following minimum features.

4.2.6.1 The interior shall be equipped with seating for passenger attendants.

4.2.6.2 The van interior must have a means of securing the number of wheelchairs that it is designed to transport. A means of securing stretchers and stretcher dollies shall also be provided.

4.2.6.3 There shall be sufficient storage for carry on baggage.

4.2.6.4 Windows shall be provided along each side of the van as a minimum.

4.2.6.5 The interior shall be ventilated and the possibility of air conditioning and heating is to be considered depending on the airport where the vehicle is to be used.

4.2.6.6 Exterior lights shall be mounted in such a way that they illuminate the front platform and rear elevating platform. Illumination shall be diffused to avoid distress to passengers.

4.2.6.7 There may be an exterior rain cover extended over the platforms to protect the passengers and attendants. The cover is not to project beyond the edge of either platform and may be offered as an option.

4.2.7 Rear Lift Platform: Access to the van body shall be in the form of a powered lift platform attached to the rear of the vehicle for access to the rear platform. It shall have a minimum capacity of 500 lb (226.8 kg), and be large enough to carry a wheelchair passenger or stretcher dolly and an attendant. It shall travel only vertically. Special attention must be paid to potential pinch points.

4.2.7.1 The lift platform shall operate from ground level to the level of the van body or rear platform floor.

4.2.7.2 The lift platform shall stop automatically when it reaches the height of the van or rear platform floor.

4.2.7.3 Safety handrails shall be provided on both sides of the platform and front and rear safety chain shall be installed.

4.2.7.4 In the event of power failure the platform shall be locked in its position. It shall be provided with an emergency lowering system.

4.3 Hydraulic System:

4.3.1 General: Raising and lowering of the lift must be accomplished by one person and through two or more hydraulic cylinders, powered by an electric or engine driven hydraulic pump. The system must incorporate a hydraulic and/or mechanical system designed to prevent lowering in the event of component failure.

4.3.2 Shut-Off: A shut-off valve must be incorporated in the system between the hydraulic supply line between the reservoir and pump or filter.

4.3.3 Reservoir: The hydraulic reservoir shall incorporate baffles, drain, clean-out cover, and fluid level indicator.

4.3.4 Hydraulic Fluid: The system shall use an anti ware type hydraulic fluid with an ISO viscosity grade of 32, and a pour point of -50 °F. The type of fluid shall be stenciled in the reservoir in 2 in (5 cm) yellow letters.

4.3.5 Hoses and Lines: All fixed lines shall be high quality steel or stainless steel. Flexible lines shall be used only where necessary and shall be high quality of fluid resistant material. All lines shall be supported and protected from chafing and binding. All lines and hoses near the engine exhaust system shall be shielded.

4.3.6 There shall be a full flow 10 micron absolute hydraulic filter rated at twice the pump capacity in the return to tank line. This filter shall be equipped with a condition indicator.

4.4 Electrical System:

4.4.1 Wiring: All wiring shall be adequately sized, fused and waterproof. Wiring shall be secured to prevent damage from rubbing and snow/ice buildup. All circuits shall be color or number coded which is to be reflected on all electrical diagrams.

4.4.2 Switches: All switches shall be weather resistant and shielded from the weather. Proximity switches are to be used wherever possible where exposure to moisture and freezing can be expected.

4.4.3 Lighting: Lighting shall be a minimum of 4 fc to illuminate the platforms, van interior and drivers position.

5. CONTROLS:

5.1 Vehicle Drive:

The controls for vehicle movement shall have three positions including a neutral detent. The lever shall be placed in the forward position to move the vehicle in reverse, and in the backward position to drive the vehicle forward.

5.2 Controls:

All controls shall work in the direction of travel where ever possible.

5.2.1 All controls shall be placarded. Placarding shall clearly illustrate the function and direction of each control.

5.2.2 Emergency stop controls shall be provided at all stations where up/down controls are located.

5.2.3 Controls for normal van up/down and stabilizers up/down shall be located at the drivers position in the case of the driver being located with the van body. A second set of controls are required within the van body in the case of cab-chassis mounted systems.

6. TOWING:

6.1 Tow Hooks:

Tow hooks shall be mounted to the front and rear of the unit. They shall be structurally capable of withstanding loads associated with vehicle towing. They shall not be mounted to the face of bumpers.