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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE INFORMATION REPORT

SAE AIR4652

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Design Factors - Handicapped Passenger Boarding Devices

1. SCOPE:

This SAE Aerospace Information Report (AIR) covers handicapped passenger boarding devices used airside to transfer handicapped passengers between the terminal building and the aircraft. It provides an elevating platform to facilitate access to the aircraft; it does not cover devices for in-terminal or streetside transfers, wheelchairs for on-board aircraft or in-terminal usage, or aircraft boarding bridges. However, it should be recognized that for many handicapped passengers, a boarding chair is necessary for the lifting operation and movement to the passenger's seat inside the aircraft cabin. Such wheelchairs are widely used in larger aircraft, and the Federal Aviation Agency has developed a performance specification for a boarding chair for commuter aircraft.

1.1 Purpose:

This AIR provides basic information on requirements for handicapped passenger boarding devices suitable for:

a. Transferring handicapped passengers to an aircraft; and/or

b. Providing a platform of suitable size and height to facilitate their transfer onto an aircraft

2. APPLICABLE DOCUMENTS:

2.1 SAE Publications:

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

ARP836	Design and Safety Criteria for Passenger Boarding Stairways
ARP1247	General Requirements for Aerospace Ground Support Equipment, Motorized and Non-Motorized
ARP1328	Aircraft Ground Support Equipment Vehicle Stability Analysis

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2.1 (Continued):

AIR1375	Minimum Safety Requirements for Special Purpose Airline Ground Support Equipment
AIR1558	Interface Protective Devices - Ground Equipment to Aircraft

2.2 Other Publications:

Architectural Graphic Standards - AIA - Ergonomic Standards for Handicapped

Design, Fabrication, and Demonstration of a Prototype Commuter Aircraft Boarding Chair, DOT/FAA Contract DTFA 03-90-C-00013

CFR Section 14, Part 382: DOT - Nondiscrimination on the Basis of Handicap in Air Travel

2.3 Definitions:

For the purpose of this document handicapped passengers shall mean mobility impaired passengers and include two levels:

a. Ambulatory
b. Wheelchair

Aircraft shall include all sizes used in commercial service:

a. Wide body
b. Narrow body
c. Commuter

3. LIMITATIONS:

This document is intended as a basic guideline for selecting appropriate boarding devices for various terminal/aircraft configurations. It does not cover the performance of specific pieces of equipment.

4. BACKGROUND:

In the absence of aircraft boarding bridges, handicapped passengers have experienced significant difficulty in being transferred from the terminal building to the aircraft or between aircraft. Airstairs on commuter aircraft and mobile boarding stairs impose major obstacles, with the handicapped passenger frequently being manhandled over the stairs in an on-board wheelchair carried by passenger agents. This is, at best, awkward and under adverse weather conditions, dangerous for both the passenger and the attendants. An alternate method involves the use of a modified cargo lifting device, such as a modified forklift, to lift the passenger and an attendant up to the aircraft door. This method provides a rough ride and is perceived by the passenger and the public as demeaning. From both the passenger's and the airline's perspective, both of these methods are undesirable when passenger comfort and employee and passenger safety are considered.

5. FUNCTIONAL REQUIREMENTS:

The equipment should be capable of performing the following functions:

5.1 Transport wheelchair passengers and attendant(s) between levels.

5.2 Elevate the lifting platform carrying the vehicular passenger and attendant(s) to the aircraft door-sill height.

5.3 Provide a means for transferring passengers from the elevated lift platform to and from the aircraft door.

5.4 Transfer passengers from the terminal to the aircraft or aircraft-to-aircraft.

6. EQUIPMENT CONFIGURATIONS:

The equipment may exist in one of the following configurations, listed in order of decreasing cost, complexity, and capability.

6.1 Elevating Transport Vehicle:

This vehicle has a platform capable of carrying 1 to 10 passengers plus attendant(s). The platform, which may be enclosed, typically is mounted on a vehicle chassis and is capable of being raised to aircraft door-sill height.

The passenger enclosure, if fitted, may be heated and air-conditioned. In its lowered mode the unit is capable of transporting passengers comfortably between an aircraft and the terminal. It is well suited for narrow and wide bodied aircraft at airports with an appreciable volume of handicapped passengers. Due to its size, it may be unsuitable for use with commuter aircraft.

A simplified form of this device would include a converted forklift or scissors lift platform to transport the passenger(s)/attendant(s) over short distances and lift them into the aircraft. It could be equipped with a rain shield or partial enclosure. A small version of this device could be used on commuter aircraft, provided that it could accommodate the airstairs frequently used on commuter aircraft.

6.2 Elevating Device:

This unit would normally be positioned near or at the aircraft and would be capable of lifting a passenger/attendant from ground or transport vehicle level to the aircraft door sill level. It would not be used to transport passenger(s) to or from the terminal, but could be either self-propelled or towed. If the unit is towed, final positioning near the aircraft would be done manually. The lift platform may incorporate a rain shield or enclosure. A small version of this device could be used on commuter aircraft, provided that it could accommodate the airstairs frequently used on commuter aircraft.

6.3 Boarding Stair Device:

This consists of a modified set of aircraft boarding stairs which incorporates a platform that moves either vertically up the side of the unit or up the stair incline. These units are capable of handling narrow and wide body aircraft but normally cannot accommodate commuter aircraft due to their integral airstairs and handrails.

6.4 Stair Climbing Wheelchairs:

These are motorized wheelchairs designed to access conventional stairways. They are operated on flat surfaces by the passenger but require an attendant to balance and stabilize the unit when climbing stairs. They are not suitable for use on commuter aircraft due to the high bottom step and narrow handrails, and the limited load-carrying capability of the airstairs.

6.5 Ramps:

Fixed or moveable ramps can be used to board handicapped passengers provided that the ramp slopes meet the requirements of 2.2.

7. AIRCRAFT SIZE CONSIDERATIONS:

The following aircraft size/configuration factors have significant impact on the design of the device:

a. Aircraft door-sill height
b. Aircraft door width
c. Aircraft door location (LHS, RHS, in front of wing, behind wing)
d. Aircraft components adjacent to the door constituting obstructions (wing, tail, engine nacelle, propeller, etc.)
e. Airstairs/airdoor
f. Airstair handrails
g. Vertical movements of the aircraft (door-sill) during enplaning/deplaning

Low door sill heights and unique airdoor locations and airstair/handrail combinations on commuter aircraft will normally preclude the use of wide body and narrow body devices on commuter aircraft.

8. UTILIZATION CONSIDERATIONS:

At high volume airports, equipment may be dedicated for use on specific aircraft types. This equipment may be designed to carry several passengers at a time in addition to the attendant(s).

At smaller regional airports, a need exists to cross-utilize a piece of equipment on a number of different aircraft types, and the equipment has to carry only one or two handicapped passengers. Equipment may be shared between airlines or provided by the airport authority.