



U.S. Department
of Transportation
Federal Aviation
Administration

Advisory Circular

Subject: Aircraft Boarding Accessibility

Date: DRAFT

AC No: 150/5220-21C

Initiated by: AAS-100

Change:

- 1. PURPOSE.** This advisory circular (AC) contains the Federal Aviation Administration's (FAA's) accessibility standards for boarding aircraft. A fundamental goal of this document is to promote the simple, fast, and dignified boarding of all passengers regardless of physical, sensory, or cognitive capabilities.
- 2. CANCELLATION.** This AC cancels AC 150/5220-21B, Guide Specification for Devices Used to Board Airline Passengers with Mobility Impairments, dated March 17, 2000.
- 3. SCOPE.** Three common types of aircraft boarding currently in use for persons with disabilities are addressed by this document. The general boarding situations include: (1) passenger loading bridges that are entered from the terminal boarding area; (2) ramps that are moved into place to allow boarding from the tarmac; and (3) lifts from the tarmac to the aircraft door.

A basis for this AC are the principles outlined in the Americans with Disabilities Act Accessibility Guidelines (ADAAG), developed by the U.S. Access Board. Although ADAAG requirements address many areas not specifically related to transportation or boarding devices, this AC is designed to be as consistent as possible with ADAAG so that passengers may see consistency as they travel between buildings and transport vehicles.

In general this document refers only to boarding, but all references apply equally to disembarking with the described procedures occurring in reverse order.

- 4. APPLICATION.** The FAA recommends the guidelines and standards in this AC for the implementation of equipment and procedures at airports when assisting persons with disabilities board an aircraft. This AC does not constitute a regulation and in general is not mandatory. However, use of these guidelines is mandatory for such equipment and procedures funded under the Airport Improvement Program (AIP) or Passenger Facility Charge (PFC) Program. Mandatory terms such as "must" used herein apply only to those who undertake these projects using AIP or PFC funds.

Equipment meeting the performance standards provided in this circular satisfy the boarding device requirements contained in the U.S. Department of Transportation regulations 49 CFR Part 27, Nondiscrimination on the Basis of Disability in Programs or Activities Receiving Federal Financial Assistance, paragraph 27.72, and 14 CFR Part 382, Nondiscrimination on the Basis of Disability in Air Travel, paragraphs 382.39, 382.40, and 382.40a. Alternate means of satisfying these requirements which are in accordance with applicable laws and regulations are acceptable, provided they result in a substantially equivalent, or greater, level of accessibility and usability.

5. PRINCIPAL CHANGES. This document represents a complete revision of the previous version of the AC, in terms of both content and structure. The equipment design standards found in the Society of Automotive Engineers (SAE) Aerospace Recommended Practice (ARP) 1247, General Requirements for Aerospace Ground Support Equipment Motorized and Non-motorized, are not considered in this revision, except as a reference, because they are not related directly to accessibility. ARP 1247 contains the recommended industry specifications for the following equipment characteristics: aircraft compatibility, total life, reliability, service and access, environmental, transportability, safety (personnel and equipment), noise and vibration, manuals/publications, design and construction, maintenance, and quality assurance provisions.

6. COMMENTS OR SUGGESTIONS for improvements to this AC should be sent to:

Manager, Airport Engineering Division
Federal Aviation Administration
ATTN: AAS-100
800 Independence Avenue, S.W.
Washington, DC 20591

7. COPIES OF THIS AC. The Office of Airport Safety and Standards is in the process of making ACs available to the public through the Internet. These ACs may be found through the FAA home page (www.faa.gov). A printed copy of this AC and other ACs can be ordered from:

U.S. Department of Transportation
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CHAPTER 1. INTRODUCTION.

1.1. BACKGROUND / LITERATURE REVIEW.

In order to provide a better understanding of the rationale behind aircraft boarding accessibility standards, a brief overview of the applicable laws and corresponding regulations is necessary.

a. Laws.

i. **Air Carrier Access Act (ACAA)** of 1986 (49 U.S.C. § 41705) prohibits discrimination in air transportation by domestic and foreign air carriers against qualified individuals with physical or mental impairments regardless of federal funding. It applies only to air carriers that provide regularly scheduled services for hire to the public. Requirements address a wide range of issues including boarding assistance and certain accessibility features in newly built aircraft and new or altered airport facilities.

ii. **Americans with Disabilities Act (ADA)** of 1990 (42 U.S.C. §§ 12101 et seq.). The ADA prohibits discrimination on the basis of disability in employment (Title I), State and local government (Title II), public accommodations and commercial facilities (Title III), transportation (Titles II and III), and telecommunications (Title IV). To be protected by the ADA, one must have a disability or have a relationship or association with an individual with a disability. An individual with a disability is defined by the ADA as a person who has a physical or mental impairment that substantially limits one or more major life activities, a person who has a history or record of such an impairment, or a person who is perceived by others as having such an impairment. Air Carriers are not governed by the ADA as they were previously addressed in the ACAA.

iii. **ADA Title II** prohibits discrimination on the basis of disability by public entities including state and local government and any department or other instrumentality of a state or local government, including airport facilities. Thus, airport facilities operated by state or local government entities are subject to the new construction and alteration requirements. Subtitle B grants jurisdiction to the Department of Transportation and the Federal Aviation Administration over public airports regardless of federal funding. Thus, an airport owned by a public entity is required to comply with the provisions of 49 CFR Parts 37 and 38. For example, Section 37.33 requires designated or fixed route transportation systems in airports (i.e. shuttle service between parking lots and terminals) to be accessible to people with disabilities. ADA standards maintained by the Department of Transportation (DOT) cover public transportation facilities, including bus stops, rail stations, and airports. On October 30, 2006, DOT adopted new ADA standards based on the Board's updated guidelines. The standards took effect November 29, 2006 for new construction and alterations.

iv. **ADA Title III** defines airports as commercial facilities but not as "places of public accommodation" so privately operated airports are subject to the new construction and alteration requirements found in Part D of 28 CFR Part 36. Concessionaires at the airport such as restaurants, bookstores, and gift shops, are places of public accommodation and must comply with ADA Title III requirements.

v. **Architectural Barriers Act (ABA)** of 1968 (42 U.S.C. §§ 4151 et seq.) requires that buildings and facilities that are designed, constructed, or altered with federal funds, or leased by a federal agency, comply with federal standards for physical accessibility. ABA requirements are limited to architectural standards in new and altered buildings and in newly leased facilities. They do not address the activities conducted in those buildings and facilities. Several agencies are responsible for maintaining

standards under the ABA: the Department of Defense, the Department of Housing and Urban Development, the General Services Administration, and the U.S. Postal Service. The new ABA standards will replace the **Uniform Federal Accessibility Standards (UFAS)**, which these agencies jointly adopted in 1984. Generally, each agency's standards apply to facilities it controls or funds, except the General Service Administration's which also apply to the rest of the Federal sector. GSA adopted new standards based on the Board's updated ABA guidelines on November 8, 2005. The standards apply to construction and alterations that commence after May 8, 2006, and to leases entered into after August 7, 2006.

vi. **Section 504 of the Rehabilitation Act of 1973, as amended** (29 U.S.C. 794) prohibits discrimination against any qualified person with a disability in any program or activity receiving federal financial assistance or under any federally conducted program or activity.

b. Regulations.

i. **ACAA** regulations were published on March 6, 1990 (14 CFR Part 382). The following sections address the need for devices to board people with mobility impairments:

- Section 382.39 - Provision of Services and Equipment requires carriers to provide services and equipment to qualified individuals with disabilities including boarding chairs, lifts, and ramps to enplane and deplane the aircraft where level entry boarding via a loading bridge or accessible passenger lounge is not available.

- Section 382.40 – Boarding Assistance for Small Aircraft requires carriers operating aircraft with 19 to 30 seats at airports with 10,000 or more enplanements to provide boarding assistance to passengers with disabilities using mechanical lifts, ramps, or other suitable devices that do not require employees to lift or carry passengers up stairs.

- Section 382.40a – Boarding Assistance for Large Aircraft requires carriers operating aircraft with 31 or more seats at airports with 10,000 or more enplanements where passengers are not boarded by level-entry loading bridges or accessible passenger lounges to provide boarding assistance to passengers with disabilities using mechanical lifts, ramps, or other suitable devices that do not require employees to lift or carry passengers up stairs.

ii. **ADA Title II** (28 CFR Part 35) and **Title III** (28 CFR Part 36) regulations address the airport facility and do not pertain to the functions of the air carrier. The ADA covers access to the airport (parking, entrances, telephones, counter heights, width of corridors, etc). It does not require the airport or airline to provide mobility aids, any more than a restaurant or bank has to provide mobility aids. Portions of the airport that are governed by the ADA Title III regulations, such as restaurants and shops are governed by the Americans with Disabilities Act Accessibility Guidelines (ADAAG) published in 1994. Facilities governed by the Department of Transportation apply the Revised ADA/ABA Accessibility Guidelines published in July 2004.

iii. **ABA** regulations (41 CFR 102-76) pertain to the accessibility of buildings or facilities rather than devices used to board aircraft. Initially, the 1961 ANSI A117.1 standard was referenced for the technical accessibility requirements. Later, the Access Board developed the guidelines that became the 1984 Uniform Federal Accessibility Standard (UFAS). UFAS is being replaced by the Executive Departments as they adopt the Architectural Barriers Act Accessibility Guidelines (ABAAG) published in the Federal Register in July 2004 (FR). The US Department of Transportation has adopted the ABAAG as they pertain to transportation facilities as of October 30, 2006 (FR). The Architectural Barriers Act requires access to facilities designed, built, or altered with Federal money or leased by

Federal agencies. Similar to the process under the ADA, the Board sets guidelines which underpin the standards that must be followed.

iv. **Section 504** regulations pertaining to transportation facilities were published on September 6, 1991 (49 CFR Part 27). Section 27.72 Boarding Assistance for Aircraft addresses the need for devices to board people with mobility impairments. Airports in cooperation with air carriers in airports with 10,000 or more annual enplanements shall provide boarding to individuals with disabilities using mechanical lifts, ramps, or other devices that do not require employees to lift or carry passengers up stairs on aircraft with 19 or more seats. This provision does not apply to aircraft with fewer than 19 seats, float planes, and access to certain 19 seat aircraft models including the Fairchild Metro, the Jetstream 31, the Beach 1900 C and D models, and any other 19 seat aircraft determined by DOT for boarding by lift, ramp or other suitable device on the basis of significant risk of serious damage to the aircraft.

1.2. PERSONS WITH DISABILITIES.

a. Passenger disabilities addressed in this document include mobility, sensory, and cognitive. It is important to recognize that, for each of these types of disabilities, there exists a full range of characteristics. Mobility impairments range from people that have difficulty walking due to use of a prosthetic, to the high level paraplegic. There are all manner of other causes of mobility limitations in between including, for example, cerebral palsy, muscular dystrophy, low level spinal cord injury, congenital deformity, polio, and age. Likewise, sensory impairments are on a continuous scale; most people with visual and hearing impairments are not totally blind or deaf but may have a very limited range of visual or aural stimuli that they can detect.

b. Understanding that all of the different disabilities include a wide range of severity is essential in planning facilities that are appropriate for everyone, i.e. universal. If only one manifestation of a disability is considered, many others may be left out. For example, talking about persons with mobility impairments typically conjures up images of wheelchair users. Often the elderly that walk with a shuffle are not considered in this category and so the importance of handrails, level surfaces at transitions, and appropriate floor surfaces may not be considered.

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CHAPTER 2. GENERAL DESIGN CRITERIA.

2.1. UNIVERSAL DESIGN.

a. “Universal design” is a concept that aims to provide an equal level of service to persons of all ages and abilities. As applied to the field of aviation, universal design is fundamental to the safe and efficient transportation of the flying public.

b. Applying the universal design methods, different approaches can be taken for boarding persons with disabilities. To board a regional jet from the tarmac, for example, consider persons that are capable of walking only a very short distance. They may currently be required to transfer from their personal wheelchair to a boarding chair and then be wheeled by a boarding agent to the aircraft via a ramp (or lift). An alternative would be to use a ramp (or lift) which would accommodate the person’s personal mobility device right up to the aircraft door. That passenger could then *independently* get to the aircraft door and walk to their assigned seat.

c. The previous example illustrates two possible methods for transporting a person with limited mobility to and from an aircraft. The recommendations of this AC outline many, but not the only, acceptable approaches for providing access to aircraft.

d. In keeping with the concept of universal design, the overall philosophy of this document is to specify performance rather than to define the details (i.e., prescribe) for a particular transportation solution. In general, where numbers are specified, they are minimum values required to ensure access to the majority of potential passengers.

2.2. BOARDING DEVICES.

a. This document also recognizes that new ideas and more sophisticated designs for passenger boarding equipment are continually being developed as the design of airports and aircraft, the security requirements, and the preferred operational procedures and business practices of airlines are evolving. It is not possible to anticipate future developments that may fall outside the contents of this advisory circular. An effort has therefore been made to include where appropriate at least a brief explanation of the reason for each recommendation so that the intent can be extrapolated to future improvements not specifically covered at this time.

b. There are two fundamental types of boarding devices considered in this document. The first is devices that provide people with a path for moving from either a terminal or the tarmac to the aircraft door. The second type of boarding device is used to move people that cannot walk on their own along the path to the aircraft door.

In the first category there are three basic types of devices currently in use:

- Passenger loading bridges that are fixed to the terminal boarding area at one end, and moveable at the other end to mate with a parked aircraft.
- Ramps used to board aircraft from the tarmac
- Lifts used to board from the tarmac

The second category of device is commonly known as an aisle chair. In this document it will be called a transfer device in deference to the fact that there are existing devices that do not use a chair or seat. The transfer device is a mobility device that can be used to move passengers from their personal chair to their assigned seat on the aircraft, the key feature being that it is small enough to move down the aisle of aircraft.

Persons that must use wheelchairs are transferred to the transfer device, moved to the row in the aircraft in which they are to be seated, and then transferred to that seat. For the most common type of transfer device, the aisle chair, an extensive set of requirements has been developed by the Access Board. This advisory circular will not duplicate the work done by the access board to address this type of transfer device.

This document does provide some general performance requirements for the transfer device. These requirements are intended to include all types of transfer device including, for example, those that make use of a sling instead of a seat and have a powered lift instead of requiring that boarding personnel do the lifting.

CHAPTER 3. PERFORMANCE.

3.1. ITEMS COMMON TO PASSENGER LOADING BRIDGES, RAMPS AND LIFTS.

a. Dimensions of the walkway or lift space should be such that a wheelchair or boarding device that is up to 28 inches wide, 60 inches long and 60 inches high can negotiate the entire path to within 5 feet of the aircraft door. This choice of dimensions recognizes the desirability of allowing persons with limited mobility to use their personal chair up to the point at which they can transition to walking. In practice it means that the path must be at least 32 inches wide to allow room to operate a 28 inch wide manual chair. For passenger loading bridges this is currently a common practice. For ramps and lifts, this is less common because some existing equipment is designed for use only with a boarding device such as an aisle chair. Reference revised Americans with Disabilities Act - Architectural Barriers Act (ADA-ABA) Guidelines (2004) Section 403.5.

b. Flooring should be a very firm or hard surface with medium-high friction. For example, a very low pile carpet or a medium-high m friction vinyl would be appropriate. Consideration must be given to possible exposure to weather to avoid slippery surfaces when wet. The goal is to provide a surface that works well for wheelchairs as well as persons with limited mobility. The ADAAG for Transportation, section 1192.23 (b) (6) states:

“The requirement for slip resistance is a general performance requirement. The Board had considered using a measure of the static coefficient of friction to determine slip resistance but the practical difficulties of defining an appropriate test procedure convinced the Board that a specific requirement should not be imposed.”

Additional explanation is available both in the ADAAG for transportation and in the guidelines for buildings and should be used as guidelines for determination of the appropriateness of specific materials for flooring surfaces in boarding devices. Reference revised ADA-ABA Guidelines (2004) Section 302 and ADAAG for Transportation (1998), section 1192.23.

c. Transition points at the entry and exit points for the boarding device and at any intermediate point where either a horizontal or vertical gap may exist should permit easy passage for all types of mobility aids ranging from canes and walkers to full size wheelchairs. Specifically they should allow easy passage for devices with wheel diameters as small as 4 inches. All thresholds and the boarding edge of ramps or lift platforms should have a band of color(s) running the full width of the edge which contrasts from the lift or ramp surface, either light-on-dark or dark-on-light. This provision applies to the edge of transition plates between segments of a passenger loading bridge, to the transition between the boarding device floor and aircraft floor for all devices, and to the point at which the passenger moves from the tarmac to a ramp or lift. For practical purposes this means that along the path to the aircraft there can be no greater than a 1-1/2 inch horizontal gap, that there can be no greater than a 1/2 inch vertical elevation change, and that all such transitions should be clearly marked. (**NOTE: ADA-ABA guidelines require treatment for any vertical elevation change greater than 1/4 inch.**) For most passenger loading bridges, lifts, and ramps these are very tight tolerances; for most aisle chairs, walkers, and other boarding aids these are at the outside limit of what can be readily negotiated. A typical solution is to provide a simple bridge plate, either manually or mechanically deployed in these situations. Reference revised ADA-ABA Guidelines (2004) Section 303.

d. Load Capacity must take into account that an unoccupied personal mobility aid may weigh up to 350 lb and that it may be occupied by a passenger weighing up to 350 lbs. It must also take into account the possibility of a transfer taking place at the aircraft door. The actual design load should be appropriate for the service. If it is a lift designed to be occupied only by the passenger in a personal

mobility aid then the design load might be 700 lb; if two boarding agents are to accompany the passenger then their weight should be included in the design load, and so on.

e. Handrails should be provided wherever possible on both sides of the entire boarding path. The height, spacing and rail diameter and other key dimensions should be as presented in the ADAAG for buildings. Reference revised ADA-ABA Guidelines (2004) Section 505.

f. Edge protection must be provided on all boarding paths that are above ground level to prevent wheelchair casters and crutch tips from slipping off the edge of the path surface. This protection should be in accordance with section of 405.9 of the ADAAG building guidelines. In the case of a fully enclosed pathway the sides of the enclosure serve as edge protection. In the case of ramps or lifts that are not enclosed, edge protection must be provided in addition to the handrail. Reference revised ADA-ABA Guidelines (2004) Section 405.9.

g. Lighting should be provided at all points along the boarding path at a level of 15 foot candles or greater. This is very important for all passengers as they negotiate a path with numerous transitions that occur within a short distance. The selected level is consistent with recommendations in human factors handbooks by (1) Salvendy and (2) Woodson, Tillman and Tillman, and it is consistent with typical lighting levels inside aircraft.

3.2. ITEMS SPECIFIC TO PASSENGER LOADING BRIDGES.

a. Sloped Regions of a passenger loading bridge should not exceed a running slope of 4.76 degrees (pitch of 1ft vertical for 12 feet horizontal). This is consistent with the absolute minimum requirements for ramps as specified in the guidelines for buildings. Reference revised ADA-ABA Guidelines (2004) Section 405.

b. Transitions between telescoping sections should meet the requirements of transition points in “3.1.c” and should not increase the slope to more than 10 degrees. Handrails should be provided on both sides of each transition. The transition between telescoping sections is a particular hazard to persons with mobility impairments of all types and should be made as easy to negotiate as possible.

c. Service Door providing access to the tarmac should have a minimum width of 30 inches and open to a landing such that a wheelchair (as specified in section 3.1.a) can be moved to or from the passenger loading bridge through this door. After a wheelchair using passenger has been transferred to their aircraft seat, their wheelchair may need to be moved to the baggage hold of the aircraft. This procedure is expedited if the chair can be moved directly from the loading bridge to the tarmac either using a built in baggage elevator or through the service door to an exterior lift.

3.3. ITEMS SPECIFIC TO RAMPS.

a. Running Slope of a ramp should not exceed 4.76 degrees (pitch of 1ft vertical for 12 feet horizontal). It should be noted that extended length ramps at a slope of 1 in 12 are very difficult for a manual wheelchair user to negotiate independently and longer ramps at 1:20 are recommended. Reference revised ADA-ABA Guidelines (2004) Section 405.2.

b. Landings should interrupt any ramp not less frequently than after each 30 inches of change in elevation. The landing should provide a space adequate for a wheelchair as specified in section 3.1.a of this document. The intent of both this and the preceding is to provide a path that is comfortable for use by persons with mobility limitations and to be consistent with the requirements for ramps

specified by the ADA-ABA guidelines for buildings. Reference revised ADA-ABA Guidelines (2004) Section 405.7.

c. Edge Protection should be provided for all sections of a ramp to prevent any possibility that a passenger or any mobility aids being used might travel beyond the edge of the ramp. Acceptable methods for providing edge protection are described in the ADA-ABA guidelines for buildings. Reference revised ADA-ABA Guidelines (2004) Section 405.9.

3.4. ITEMS SPECIFIC TO LIFTS.

a. Platform Barriers should be provided to prevent any possibility that a passenger or any mobility aids being used might travel beyond the edge on any side of the platform except when the platform is stopped and the passenger is either entering from the tarmac or exiting to the aircraft. Edge protection may be as described for fixed ramps in the ADA-ABA guidelines for buildings, as described for bus lifts in the ADAAG for Transportation, or as some combination of the two. Moveable barriers should conform to the safety concerns presented in the ADAAG for transportation. The goal is to prevent any portion of canes, walkers, wheelchairs, and passengers from going beyond the edges of the platform except at the entry and exit points and then only when the passenger is entering or exiting the lift. Depending on the design of the lift, the barriers may take the form of railings, some of which may move to allow entry and exit from the platform. They may also take the form of ramps that fold up to provide a barrier when not being used to enter or exit the platform. Reference ADAAG for Transportation (1998), section 1192.23.b.5 and revised ADA-ABA Guidelines (2004) Section 405.9.

b. Platform movement when occupied should not change with acceleration greater than 10 ft/s² and at no time should the speed of the platform exceed 6 in/s. This is consistent with the requirements for lifts specified in the ADAAG for transportation. Reference ADAAG for Transportation (1998), section 1192.23.b.10.

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CHAPTER 4. PASSENGER TRANSFER DEVICES.

4.1. PASSENGER TRANSFER EQUIPMENT (AISLE CHAIR OR OTHER TRANSFER DEVICE).

a. **Capacity** of equipment for transferring passengers from their personal wheelchairs to their aircraft seat should have a minimum capacity of 350 lb. A definitive ruling on passenger weight does not currently exist but anecdotal data suggest strongly that this weight is a practical upper limit for passengers in airline seats as they currently exist.

b. **Stability** must be assured for transfer equipment during all circumstances involving a passenger including the transfer from a wheelchair, movement into the aircraft and down the aisle, and transfer to the aircraft seat. Transfer devices must be small to pass down the aircraft aisle but there must be no possibility of them tipping over under any circumstances when occupied.

c. **Passenger Safety** should be designed into the transfer device with the knowledge that the passenger, for example, may not have tactile sensations to provide feedback when pressure points exist, may not have trunk control to maintain good posture when being moved in the device, and may experience muscle spasms that will cause erratic motion at any time. The Guidelines for Aircraft Boarding Chairs go into many aspects of passenger safety and serve as a good reference for design guidelines. Reference Guidelines for Aircraft Boarding Chairs (1987), Access Board.

d. **Boarding Agent Safety** should be designed into the transfer device with the knowledge that the agent will be responsible for the passenger transfers to and from the device as well as moving the device to and from the aircraft seat. The transfer device should be designed such that all lifting and positioning operations to be performed by the boarding agent can be done in a way that will minimize the risk of injury. The particular operations that should be considered are manual dependent transfers (two boarding agents lifting the passenger to or from the boarding device) and movement of the occupied device from the transfer area to a position for transfer to the aircraft seat (this includes, for example, turning the device and crossing the aircraft door threshold). Reference Guidelines for Aircraft Boarding Chairs (1987), Access Board.

e. **Powered Transfer Equipment** should be designed with special consideration for safety of both the operator and the passenger. There should be no possibility of inadvertent operation or of a person accidentally putting a part of their body in a place where operation of the device may cause injury.

4.2. TRAINING.

a. **All boarding devices** should include training materials that clearly explain the correct operation of that equipment. This should include the sequence of operations, important points to observe to protect both people and equipment, and interactions with other boarding devices (for example, lift instructions should include a section on how to move a transfer device onto a lift and secure it for the lift).

b. **Pictorial Representation** should be used wherever possible as a universal approach to instructions. For many of the people that will be assisting passengers with a boarding device, English is not their first language. It is important that procedures involving safety in particular are presented in a way that is immediately understandable by any person likely to be employed in the air transportation industry.

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APPENDIX A. ANNOTATED BIBLIOGRAPHY

Advisory Circulars

AC 150/5210-5C, Painting, Marking, and Lighting of Vehicles Used on an Airport, dated August 31, 2007. FAA recommends these guidelines and standards for vehicles operating in the airport. Vehicle is defined as all conveyances, except aircraft, used on the ground to transport persons, cargo, equipment or those required to perform maintenance, construction, service, and security duties. Use of these guidelines is mandatory for vehicles funded under Federal grant assistance programs.

AC 150/5220-21B, Guide Specifications for Devices Used to Board Airline Passengers with Mobility Impairments, dated March 17, 2000, contains performance standards, specifications, and recommendations for the design, construction, and testing of portable devices used in the boarding of airline passengers with mobility impairments, other than passenger loading bridges. Compliance with this Advisory circular satisfies the boarding device requirements found in DOT's Section 504 regulations, 49 CFR 27.72(b), and ACAA regulations, 14 CFR 382.39(a)(2). The specifications in this Advisory Circular are mandatory for airports using Federal grant-in-aid assistance in the purchase of such devices.

AC 150/5360-14, Access to Airports by Individuals with Disabilities, dated June 30, 1999. This advisory circular outlines the laws and regulations regarding individuals with disabilities as they apply to airports operated by public entities and those receiving federal financial assistance.

Guidance

CAN/CGSB-189.1-95, Lifting Systems for Aircraft Boarding of Passengers with Mobility Impairments. The standard specifies the requirements for design, construction, performance and testing of self-propelled and manually transported or towed lifting equipment used to assist in the boarding of aircraft passengers with mobility impairments.

SAE ARP 1247, General Requirements for Aerospace Ground Support Equipment, Motorized and Non-Motorized. This document is a recommended practice outlining the general design requirements for ground support equipment used in civil air transportation industry. It is intended to assist the airlines in standardizing the requirements for various ground equipment. Topics addressed include safety of person operating equipment, safety of person using equipment, safety of the equipment itself, maintenance of the equipment, repairs, and testing.

United States Architectural and Transportation Barriers Compliance Board (Access Board) Guidelines for Aircraft Boarding Chairs. This document is a technical paper intended to improve the design and use of aircraft boarding chairs as a result of safety problems and complaints regarding the use of boarding chairs. The scope of the guidelines is broad enough to apply to the various types of boarding chairs and is in no way intended to restrict design freedom. The needs of both the person with a disability using the boarding chair and the airline employees assisting the person with a disability, thus the physical characteristics of both types of users are described in the paper. The technical design sections outline the seat size and capacity, adjustable parts, removable parts, safety belts, wheels, backrest, arms, cushioning, and footrests. Inspection of the devices and training on use of the devices is also addressed.

United States Department of Transportation's Technical Assistance Manual What Airline Employees, Airline Contractors, and Airline Travelers with Disabilities Need to Know About Access to Air Travel for Persons with Disabilities: A Guide to the Air Carrier Access Act (ACAA) and its implementing regulations, 14 CFR Part 382, provides guidance to employees/contractors of air carriers on the services,

facilities and accommodations required by the ACAA to assist passengers with disabilities. This Manual addresses assisting air travelers with disabilities plan their trip, throughout the airport, onto the aircraft, during flight, deboarding, stowage of personal equipment on the aircraft, and how to file a complaint if necessary.

APPENDIX B. USEFUL ACCESSIBILITY TERMS

Air Carrier – any citizen of the United States who undertakes, whether directly or indirectly or by a lease or any other arrangement, to engage in air transportation.

Air Carrier Airport – a public, commercial service airport which enplanes annually 2,500 or more passengers and receives scheduled air service.

Aircraft Boarding Chair – wheelchair-like devices used to transport disabled passengers onto airplanes.

Aircraft lift – a device used to elevate a passenger with a disability to the aircraft cabin entrance level eliminating the need to use stairs.

Aircraft ramp – a ramp used to board a passenger with a disability into the cabin entrance eliminating the need to use stairs. According to AC 150/5220-21B, the maximum angle for the ramp shall not exceed 19 degrees and be designed for a live load of 50 psf.

Air transportation – interstate, overseas, or foreign air transportation, or the transportation of mail by aircraft, as defined in the Federal Aviation Act.

Americans with Disabilities Act (ADA) – Signed into law on July 26, 1990, the Americans with Disabilities Act (ADA) is a wide-ranging legislation intended to make American Society more accessible to people with disabilities.

Americans with Disabilities Act Accessibility Guidelines (ADAAG) – provides scoping and technical requirements for accessibility to buildings and facilities by individuals with disabilities under the Americans with Disabilities Act (ADA) of 1990. These scoping and technical requirements are to be applied during the design, construction, and alteration of buildings and facilities covered by Titles II and III of the ADA to the extent required by regulations issued by Federal agencies, including the Department of Justice and the Department of Transportation.

American National Standard Institute (ANSI) – empowers its members and constituents to strengthen the U.S. marketplace position in the global economy while helping to assure the safety and health of consumers and the protection of the environment. ANSI oversees the creation, promulgation and use of thousands of norms and guidelines that directly impact businesses in nearly every sector, including the A117.1 standard for Accessible and Usable Buildings and Facilities.

Boarding bridge – an enclosed, movable connector which extends from an **airport terminal gate** to an **airplane**, thereby enabling passengers to board and disembark without having to go outside.

Code of Federal Regulations (CFR) – the codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the Federal Government. It is divided into 50 titles that represent broad areas subject to Federal regulation.

Decubitus Ulcer – A pressure ulcer is an area of skin that breaks down when you stay in one position for too long without shifting your weight. This often happens if you use a wheelchair or you are bedridden, even for a short period of time (for example, after surgery or an injury). The constant pressure against the skin reduces the blood supply to that area, and the affected tissue dies. A pressure ulcer starts as reddened skin but gets progressively worse, forming a blister, then an open sore, and finally a crater. The most common places for pressure ulcers are over bony prominences (bones close to the skin) like the elbow, heels, hips, ankles, shoulders, back, and the back of the head.

Deplane – to disembark from an aircraft.

Disability – see person with a disability.

Domestic Air Carrier – an operator who, under FAR Part 121, conducts scheduled operations within the 48 contiguous states and the District of Columbia, utilizing aircraft with a passenger seating capacity of more than 30 or a payload of more than 7,500 pounds.

Enplane – to board an aircraft.

Federal Aviation Administration – an operating administration of the Department of Transportation that oversees the safety of civil aviation. The safety mission of the FAA is first and foremost and includes the issuance and enforcement of regulations and standards related to the manufacture, operation, certification and maintenance of aircraft.

Foreign Air Carrier – a person, not a citizen of the United States, undertaking by any means directly or indirectly, to provide foreign air transportation, 49 USC 40102.

Lift – see aircraft lift.

Manual wheelchair – Manual wheelchairs are those that require human power to move them. There are three types of manual wheelchair: self-propelled, attendant-propelled, and wheelbase. Many manual wheelchairs can be folded for storage or placement into a vehicle, although modern wheelchairs are just as likely to be rigid framed.

Paraplegia – an impairment in motor and/or sensory function of the lower extremities. It is usually the result of spinal cord injury or a congenital condition such as spina bifida which affects the neural elements of the spinal canal. The area of the spinal canal which is affected in paraplegia is either the thoracic, lumbar, or sacral regions.

Person with a disability – any individual who has a physical or mental impairment that, on a permanent or temporary basis, substantially limits one or more major life activities, has a record of such an impairment, or is regarded as having such an impairment. As used in this definition:

(a) The phrase **physical or mental impairment** means:

(1) Any physiological disorder or condition, cosmetic disfigurement, or anatomical loss affecting one or more of the following body systems: neurological, musculoskeletal, special sense organs, respiratory including speech organs, cardio-vascular, reproductive, digestive, genito-urinary, hemic and lymphatic, skin, and endocrine; or

(2) Any mental or psychological disorder, such as mental retardation, organic brain syndrome, emotional or mental illness, and specific learning disabilities.

(b) The term **physical or mental impairment** includes, but is not limited to, such diseases and conditions as orthopedic, visual, speech, and hearing impairments; cerebral palsy, epilepsy, muscular dystrophy, multiple sclerosis, cancer, heart disease, diabetes, mental retardation, emotional illness, drug addiction, and alcoholism.

(c) **Major life activities** means functions such as caring for one's self, performing manual tasks, walking, seeing, hearing, speaking, breathing, learning, and working.

(d) **Has a record of such impairment** means has a history of, or has been classified, or misclassified, as having a mental or physical impairment that substantially limits one or more major life activities.

(e) **Is regarded as having an impairment** means:

(1) Has a physical or mental impairment that does not substantially limit major life activities but that is treated by an air carrier as constituting such a limitation;

(2) Has a physical or mental impairment that substantially limits a major life activity only as a result of the attitudes of others toward such an impairment; or

(3) Has none of the impairments set forth in this definition but is treated by an air carrier as having such an impairment.

Quadriplegia – paralysis of all four limbs also called tetraplegia. It is caused by damage to the **brain** or the **spinal cord** cut at a high level - in particular spinal cord injuries secondary to an injury to the **cervical spine**. The injury causes victims to lose partial or total mobility of all four limbs, meaning the arms and the legs. Severity depends on which cervical vertebra is injured and the extent of the injury.

Qualified individual with a disability – an individual with a disability who purchases or possesses a valid ticket for air transportation on an air carrier and presents himself or herself at the airport for the purpose of traveling on the flight for which the ticket has been purchased or obtained and meets reasonable and nondiscriminatory contract of carriage requirements applicable to all passengers.

Revised ADA/ABA Accessibility Guidelines – published in the Federal Register in July 2004, updated the existing ADAAG and the UFAS so the design guidelines remain current and consistent with the Uniform Codes which are updated periodically.

Section 504 of the Rehabilitation Act – a civil rights law that prohibits discrimination against individuals with disabilities in any program or activity receiving federal funds.

Sports wheelchair - athletes with disabilities use streamlined sport wheelchairs for adaptive sports that require speed and agility, such as basketball, rugby, tennis, Softball, and racing. Each wheelchair sport tends to use specific types of wheelchairs. They are usually non-folding (in order to increase solidity), with a pronounced angle for the wheels (which provides stability during a sharp turn) and made of composite, lightweight materials.

Transfer board – bridges the gap between two transfer points and is used primarily for seated transfers, for example between a wheelchair and an airline seat.

Uniform Federal Accessibility Standards (UFAS) – originally published on August 7, 1984, the uniform standards for the design, construction and alteration of buildings so that physically handicapped persons will have ready access to and use of them in accordance with the Architectural Barriers Act. UFAS embodies an agreement to minimize the differences between the standards previously used by four agencies (the General Services Administration, the departments of Housing and Urban Development and Defense, and the United States Postal Service) that are authorized to issue standards under the Architectural Barriers Act, and between the access standards recommended for facilities that are not federally funded or constructed.

United States Access Board – The Access Board is an independent Federal agency devoted to accessibility for people with disabilities. Created in 1973 to ensure access to federally funded facilities, the Board is now a leading source of information on accessible design. The Board develops and maintains design criteria for the built environment, transit vehicles, telecommunications equipment, and for electronic and information technology.

United States Code – the codification by subject matter of the general and permanent laws of the United States. It is divided by broad subjects into 50 titles and published by the Office of the Law Revision Counsel of the U.S. House of Representatives.

United States Department of Justice – a Cabinet department in the United States government designed to enforce the law and defend the interests of the United States according to the law and to ensure fair and impartial administration of justice for all Americans. DOJ is agency that enforces Title II and III of the ADA.

United States Department of Transportation – a Cabinet department in the United States government that oversees the formulation of national transportation policy and promotes intermodal transportation. Other responsibilities range from negotiation and implementation of international transportation agreements, assuring the fitness of US airlines, enforcing airline consumer protection regulations, issuance of regulations to prevent alcohol and illegal drug misuse in transportation systems and preparing transportation legislation.

Wheelchair – a wheeled mobility device in which the user sits. The device is propelled either manually (by pushing the wheels with the hands) or via various automated systems. Wheelchairs are used by people for whom walking is difficult or impossible due to illness, injury, or disability.