

The Case of the Incredible Shrinking Airline Seat

History

Rulemaking Petition by FlyersRights.org August 26, 2015
(FAA-2015-0411): Requesting appointment of
advisory committee & promulgation of
minimum seat and passenger space
standards

Denied by FAA: February 1, 2016

D.C. Circuit Court Remanded: July 28, 2017

Second Denial by FAA: July 3, 2018

Law: FAA Reauthorization Act of 2018: October 5, 2018
(Ordering FAA to issue minimum seat
standards and update emergency
evacuation standards last updated 2004)

Congressional Deadline: October 5, 2019

FAA conducts evacuation testing: December 2019

FAA appoints Emergency
Evacuation Advisory Rulemaking
Committee: late 2019

Report submitted to FAA: May 20, 2020
(Contains 27 recommendations)

No rulemaking initiated, no reports
published or submitted to Congress,
in clear violation of FAA Reauthorization
Act of 2018

DOT OIG Report on Emergency
Evacuations Published: September 16, 2020
(Requested by House Transportation &
Infrastructure Committee and House
Aviation Subcommittee in March 2018)

Major increases in passenger disruption
Incidents 2020-21

DOT Secretaries fail and refuse meet with
consumer representatives: January 2013 to January 2021

FAA Administrators, since Jane Garvey,
(1997-2002) fail and refuse to meet with
consumer representatives: January 2003 to present

Background of Paul Hudson re seat and emergency evacuation issues

- National advocate for airline passengers since 1989, public interest lawyer since 1974
- Member, FAA Aviation Rulemaking Advisory Committee (1993-present), Emergency Evacuation/ Passenger Safety Issue Group (1990s)
- DOT/FAA Rulemaking and Judicial Petitioner for Seat Standards (2015-2018)
- Member, FAA Emergency Evacuation Advisory Rulemaking Committee (2019-present)
- President, FlyersRights.org (2013-present)
- Executive Director, Aviation Consumer Action Project (1997-2013)

General

Modern seats are designed for able-bodied people up to 5'10" and under approximately 180 pounds, reflecting passenger sizes in the early 1960s. Since the 1990s, airlines shrunk seats and legroom (pitch) while passengers became larger, older, and less able-bodied. As a result, only about 25% of passengers can now fit in modern airline seats and passenger space in economy class where over 90% of passengers sit. Aisle widths and bathroom space have also been reduced significantly to pack more and more people into planes. The FAA HAS NO MINIMUM SEAT SIZE OR PASSENGER SPACE REQUIREMENTS. THERE ARE MINIMUM STANDARDS FOR TRANSPORT OF ANIMALS BUT NOT HUMANS.

Human Size Increases, comparing 1960-62 data to 2015-18 data

The average adult now weighs 186 pounds compared to 155 pounds in the early 1960s. One quarter of men now weigh over 224 pounds, and one quarter of women weigh over 195 pounds according to the CDC. About 15% of men are over 6 feet, and average height for adults has increased 2 inches.

Seat Size Shrinkage

Seats in first class are now similar to economy class prior to the deregulation of airlines in 1978. The average man's shoulders are wider than the seat, and for persons over about 5'10" their head extends over the top of the seat and legs cannot be extended in a normal sitting position. People over 224 pounds are generally unable to sit in economy seats without intruding into the adjacent seat space or the aisle.

Average legroom or pitch has decreased from 35 to 31 inches, with the lowest pitch size being 28 inches (Spirit). Low cost carriers are typically at 29-30 inches. Width has decreased to 16-18 inches.

According to Bureau of Transportation Statistics (BTS) data, domestic passenger load factors—the average percentage of seats filled—have increased from 77.16 percent in 2005 to as high as 89.2% in 2019. Load factor was above 85.5% for 7 of 12 months of 2019.

Safety: Emergency Evacuation

For many decades, the FAA has had a 90 second rule requiring every airliner certified by the FAA as safe for public transport to demonstrate it can evacuate a fully loaded plane, in low light conditions with half the exits disabled, within 90 seconds.

The FAA adopted this rule because historical accident statistics show that longer evacuation times greatly increases fatalities in otherwise survivable crash landings. Deaths are due to fire, smoke or drowning rather than impact trauma in most air crashes. This rule had always required a manufacturer to conduct an actual demonstration test. However, in the mid-1990s the FAA amended this regulation to allow "analysis" to substitute for an actual full scale evacuation test. Actual demonstrations are now rare and ones using unpracticed test subjects meeting the modern demographic profile of passengers are nonexistent. Manufacturers now can substitute analysis for demonstrations, and even substitute older data for contradictory, newer data.

FAA claims to amend the evacuation standards when it identifies new risks. FAA last reviewed the standards in 2011 and found the standards acceptable. DOT standards require review every 10 years, which DOT OIG says is insufficient to meet FAA's SMS requirements for continuous risk monitoring to capture new risks such as increased carry-on baggage, changes in passenger demographics, and decreases in seat spacing.

NTSB asked the FAA to study passenger baggage behavior in 2000 and 2016, but the FAA had not yet developed a research program.

The DOT Inspector General Report of September 2020 also noted that the FAA stated in denying the FlyersRights seat petition in 2018 that the Boeing 737-300 and Airbus 320 had demonstrated successful emergency evacuation with 28 inch pitches. However, the IG found this to be untrue. The IG found out of 30 plane makers evacuation reports filed with the FAA, “almost all used seats with pitches larger than 28, some up to 38 inches.” Only one used 28 inches. See Item 10, page 7 below for details.

Of the 40 NTSB reports DOT OIG reviewed, the 5 accidents that had measurable evacuation times were 1:48, 2:11, 2:32, 3:00, and 5:00, all in excess of 90 seconds.

The Emergency Evacuation Advisory Rulemaking Committee (ARC) studied 290 actual emergency evacuations. In its May 2020 report, it made 27 recommendations for changes and improvements to evacuation standards. One recent evacuation alleged to have caused passengers in the rear to burn to death due to passengers in front slowing evacuation by taking carry-on baggage. No recommendations have been acted upon and the report remains unpublished and under review at the DOT.

1. Changed Circumstances: Since the regulations (14 CFR 25.803) were promulgated in 1967, load factors have increased dramatically, increased checked bags fees have caused carry-on bags to proliferate (DOT does not collect this data), passengers have gotten older, taller, and larger, and flight attendant staffing levels are lower.
2. Flaws that are not discussed in DOT OIG report
 - a. Multiple attempts educates test subjects
 - b. Test subjects are younger, lighter weight, and more likely to wear athletic clothing and shoes.
 - c. Baggage that is required to be placed as obstacles is not quantified by the testers or by FAA. The FAA does not collect cabin baggage statistics.
 - d. Studies show persons over 65 have reduced mobility that slows evacuation times.
 - e. Disabled persons, elderly, children, or infants not considered in evacuation testing standards.
 - f. The 2019 FAA evacuation tests were seriously flawed by excluding anyone over 250 pounds, anyone over 60 or under 18, using a small test bed with seats not similar of modern airliner seating, multiple practices, no statistical basis for carry-on baggage obstructions, no window exits, no low light conditions or multiple exits.

Health: Blood Clots/Deep Vein Thrombosis/Pulmonary Embolism (DVT/PE)

The CDC says anyone traveling more than 4 hours by air is at risk for blood clots. These clots form in the legs “when sitting still in a confined space for long periods of time.” Many times the blood clots dissolve on their own, but when they do not, they can break off and travel to the lungs and cause a fatal blockage and be fatal (pulmonary embolism).

The CDC recommends travelers extend their legs straight out and flex their ankles, an impossible task for many travelers in economy class.

The FAA takes the position that it cannot consider health issues without a command from the Secretary of Transportation, which it has not received for seat and passenger space standards. So the FAA defines seat size safety narrowly to only include emergency evacuation.

Passenger disruption incident due to stress and overcrowding

It is well known that placing rats or other animals in over-crowded confined conditions for long periods will cause them to fight and kill one another. Humans of course are civilized and can withstand over-crowding but only up to a point. The pandemic, TSA requirements for everyone to wear masks even on long flights, little to no food or beverage service, fear of COVID infection from contact with other passengers or bathrooms or other surfaces, elimination of any social distancing on planes have all ramped up passenger stress and led to more alcohol consumption and a 20 fold increase in passenger disruption (ie verbal and physical fights). This has resulted in thousands of passengers being referred to FAA OR DOJ AND OR PLACED ON NO FLY LISTS.

HUMANS ARE NOW OVER-CROWDED ON PLANES TO THE POINT OF HAVING PROPORTIONALLY LESS THAN A QUARTER OF MINIMUM SPACE REQUIREMENTS FOR DOGS.

DOT OIG Report on Emergency Evacuations (September 16, 2020)

<https://www.oig.dot.gov/library-item/38012>

Requested by the Ranking Member of the U.S. House Transportation and Infrastructure Committee and Aviation Subcommittee (DeFazio and Larsen), March 2018

Findings

1. FAA has not updated standards since 2004 (in response to a 1991 accident)
2. The FAA has only updated the standards 4 times due to accidents occurring the following years:
 - a. 1978 (new slide/raft fire resistance/strength/inflation time/testing)

- b. 1983 (seat cushion flammability, emergency path markings on floor, lavatory smoke detection, lavatory trash fire extinguishers, increased cabin fire extinguishers)
 - c. 1985 (new requirements for design and construction of exits and access to exits, exit floor lighting and markings, and emergency equipment)
 - d. 1991 (new requirements for improved access to emergency exit doors)
3. FAA has not done sufficient research on passenger behavior, carry on bags, emotional support animals, and seat size
4. FAA does not collect or preserve comprehensive evacuation data from manufacturer demonstrations and analyses that could inform the changes that need to be made
 - a. This does not meet the FAA SMS requirements or GAO Standards for Internal Control in the Federal Government
5. The FAA allows manufacturers to use out-dated data in its analyses
 - a. One 2018 certification's model was based on, in part, data from a demonstration in 1974 (44 years prior)
 - b. DOT OIG reviewed the top 10 aircraft certifications by fleet number, and found that 6 of 10 were based on analysis, and 4 of these 6 analyses were based on data 10 years old or more.
6. The FAA allows manufacturers to use out-dated data that delivers the result it wants rather than recent data that does not deliver the desired results.
 - a. "Based on our analysis, use of recent data can yield results that differ from the results based on old data. For example, a manufacturer used data that were about 12 years old to calculate the evacuation time for an aircraft model, despite the fact that data approximately 3 years old were available. The test with the 12-year-old data indicated that participants evacuated through an exit door in under 90 seconds. However, we found that use of the 3-year-old data indicated participants could not evacuate through the same door in 90 seconds."
7. The FAA allows manufacturers to rely more on analysis and less on demonstrations
 - a. "FAA's acceptance of manufacturers' greater reliance on analyses rather than on demonstrations poses risks as demonstration data grows older"
8. The FAA allows manufacturers to use data from analysis rather than demonstrations when they differ
 - a. "In our review of manufacturers' analyses, we found instances in which data from the analyses did not match data from the demonstrations the analyses were based on. When conducting an analysis, a manufacturer uses data collected from demonstrations, such as averages of passenger flow rates through exits, to calculate the numbers of passengers that it can reasonably expect to evacuate the aircraft model within the 90- second time limit. Based on our analysis, we found that FAA certified 10 aircraft models based on inaccurate data or allowed

manufacturers to exclude the evacuation times of some passenger and crew participants when determining exit times.”

- b. “For example, one report stated that the manufacturer based its analysis for certification on data from a demonstration, but the data the manufacturer used in its analysis differed from the demonstration data. Specifically, in the analysis report, the number of passengers that evacuated from three of four exit doors differed from the numbers in the demonstration report. However, FAA certified the aircraft model. It is unclear whether at the time of certification, FAA recognized the differences in the numbers”
 - c. “In addition to exit times, manufacturers’ reports often contain information on factors such as passenger tendencies in exit door selection and adherence to crew instructions.³² FAA officials informed us that the Agency does not retain these data because the manufacturers state the information is proprietary, even though FAA can obtain them upon request. FAA’s lack of an historical record of these data inhibits the Agency’s ability to identify data inaccuracies and risks that could slow exit times.”
9. FAA’s lack of data inhibits its ability to meet the 2018 Congressional mandate
- a. “At this time, however, FAA has no plans to conduct research on carry-on baggage or emotional support animals. Furthermore, the Agency has not outlined plans to update passenger demographics, although researchers plan to collect data on height, weight, and girth from participants in the seat pitch study. To address the other mandates, FAA has convened an Emergency Evacuation Standards Aviation Rulemaking Committee (ARC) of industry experts to review evacuation requirements, actual evacuations, and the results of the seat pitch testing. ARC submitted its report to FAA in May 2020, but to date, FAA has not submitted its report to Congress”
10. In the FAA’s second response to FlyersRights’ petition in 2018, the FAA claimed (and relied on videos showing) that full-scale evacuation demonstrations were performed on the Boeing 737-300 and Airbus 320 with a **28 inch pitch**. However, the DOT IG found that these aircraft had pitches **above 28 inches**.
- a. “In 2015, a passenger advocacy group petitioned FAA to set a minimum standard for seat dimensions due to members’ concerns over seat spacing and safety. **In its 2018 response to the petition, FAA stated that full-scale evacuation demonstrations have been performed on models with all seat pitches at 28 inches—including the Boeing 737-300 and the Airbus 320.** We reviewed 43 manufacturers’ evacuation demonstration reports provided by FAA, and found that 30 reports referred to seat pitches. One report discussed a demonstration the manufacturer conducted using seats that all had pitches of 28 inches. The 29 other reports discussed demonstrations that almost all used seats with pitches larger than 28 inches, some up to 38 inches. **Among the aircraft in these 29 reports**

were the Boeing 737-300 and the Airbus 320, which both had pitches above 28 inches during their evacuation demonstrations.” (DOT OIG Report pg. 12) (emphasis added)

- b. “Lack of comprehensive information on the pitches of seats used in evacuation demonstrations hinders FAA’s ability to respond to public concerns about seat pitch. It also affected the accuracy of the Agency’s response to the 2015 passenger petition.” (DOT OIG REport pg. 12)

“Due to FAA’s lack of an up-to-date study on passenger demographics, it is unclear whether the mix of passengers involved in demonstrations reflects the current flying public, and whether updates to the mix are necessary.” (DOT IG September 2020 Report)

Requests to the Secretary

1. Require establishment of a representative advisory committee to recommend seat and passenger space standards within 180 days.
2. Place a moratorium on further reduction in seat and passenger space through a temporary rule or interim final rule.
3. Require FAA to conduct new, realistic emergency evacuation testing within 90 days using representative test subjects with varying seat and passenger spaces.
4. Require publication of Evacuation ARC May 2020 Report with rulemaking to commence in 30 days to be completed within 180 days.
5. Order the FAA Administrator to meet with the Evacuation ARC and passenger representatives within 30 days.
6. Require the FAA to consider health and human rights issues in setting seat and passenger space standards.

APPENDIX

2015 Rulemaking Petition: <https://www.regulations.gov/document/FAA-2015-4011-0001>

2016 FAA Rejection: <https://www.regulations.gov/document/FAA-2015-4011-0140>;
<https://www.regulations.gov/document/FAA-2015-4011-0147>

D.C. Cir. Remand Decision 2017: <https://flyersrights.us/wp-content/uploads/2017/07/Flyers-Rights-v-FAA-OPINION-7-28-2017.pdf>

2018 (2nd) FAA Rejection: <https://www.regulations.gov/document/FAA-2015-4011-0160>;
<https://www.regulations.gov/document/FAA-2015-4011-0159>;

<https://www.regulations.gov/document/FAA-2015-4011-0156>;
<https://www.regulations.gov/document/FAA-2015-4011-0158>;
<https://www.regulations.gov/document/FAA-2015-4011-0157>.

Space standards for transporting animals

Cats are entitled to 3 or 4 square feet of floor space. Dogs are entitled to the formula below. This requirement is for an animal's primary enclosure when not transported.

When transported, the animal must have:

“(e) Space and placement.

(1) Primary enclosures used to transport live dogs and cats must be large enough to ensure that each animal contained in the primary enclosure has enough space to turn about normally while standing, to stand and sit erect, and to lie in a natural position.” **9 CFR 3.15**

For non-transportation purposes:

For an average man, 5'8", the equivalent minimum floor space required for a dog would be 38 square feet

9 CFR 3.6 (a)(2)(xi) and (c)(1)

(xi) Provide sufficient space to allow each dog and cat to turn about freely, to stand, sit, and lie in a comfortable, normal position, and to walk in a normal manner; and

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(c) *Additional requirements for dogs* -

(1) *Space.*

(i) Each dog housed in a primary enclosure (including weaned puppies) must be provided a minimum amount of floor space, calculated as follows: Find the mathematical square of the sum of the length of the dog in inches (measured from the tip of its nose to the base of its tail) plus 6 inches; then divide the product by 144. The calculation is: (length of dog in inches + 6) × (length of dog in inches + 6) = required floor space in square inches. Required floor space in inches/144 = required floor space in square feet.

(ii) Each bitch with nursing puppies must be provided with an additional amount of floor space, based on her breed and behavioral characteristics, and in accordance with generally accepted husbandry practices as determined by the attending veterinarian. If the additional

amount of floor space for each nursing puppy is less than 5 percent of the minimum requirement for the bitch, such housing must be approved by the attending veterinarian in the case of a research facility, and, in the case of dealers and exhibitors, such housing must be approved by the Administrator.

(iii) The interior height of a primary enclosure must be at least 6 inches higher than the head of the tallest dog in the enclosure when it is in a normal standing position: *Provided That*, prior to February 15, 1994, each dog must be able to stand in a comfortable normal position.

FAA Reauthorization Act of 2018

<https://www.congress.gov/bill/115th-congress/house-bill/302/text>

SEC. 577. MINIMUM DIMENSIONS FOR PASSENGER SEATS. (132 Stat. 3394) (49 USC 42301 note)

(a) IN GENERAL.—Not later than 1 year after the date of enactment of this Act, and after providing notice and an opportunity for comment, the Administrator of the Federal Aviation Administration shall issue regulations that establish minimum dimensions for passenger seats on aircraft operated by air carriers in interstate air transportation or intrastate air transportation, including minimums for seat pitch, width, and length, and that are necessary for the safety of passengers.

(b) DEFINITIONS.—The definitions contained in section 40102(a) of title 49, United States Code, apply to this section.

SEC. 337. AIRCRAFT CABIN EVACUATION PROCEDURES.

(a) REVIEW.—The Administrator of the Federal Aviation Administration shall review—

(1) evacuation certification of transport-category aircraft used in air transportation, with regard to—

(A) emergency conditions, including impacts into water;

(B) crew procedures used for evacuations under actual emergency conditions;

(C) any relevant changes to passenger demographics and legal requirements, including the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.), that affect emergency evacuations; and

(D) any relevant changes to passenger seating configurations, including changes to seat width, padding, reclining, size, pitch, leg room, and aisle width; and

(2) recent accidents and incidents in which passengers evacuated such aircraft.

(b) CONSULTATION; REVIEW OF DATA.—In conducting the review under subsection (a), the Administrator shall—

(1) consult with the National Transportation Safety Board, transport-category aircraft manufacturers, air carriers, and other relevant experts and Federal agencies, including groups representing passengers, airline crew members, maintenance employees, and emergency responders; and

(2) review relevant data with respect to evacuation certification of transport-category aircraft.

(c) REPORT TO CONGRESS.—Not later than 1 year after the date of enactment of this Act, the Administrator shall submit to the appropriate committees of Congress a report on the results of the review under subsection (a) and related recommendations, if any, including recommendations for revisions to the assumptions and methods used for assessing evacuation certification of transport category aircraft.

14 CFR 25.803

§ 25.803 Emergency evacuation.

(a) Each crew and passenger area must have emergency means to allow rapid evacuation in crash landings, with the landing gear extended as well as with the landing gear retracted, considering the possibility of the airplane being on fire.

(b) [Reserved]

(c) For airplanes having a seating capacity of more than 44 passengers, it must be shown that the maximum seating capacity, including the number of crewmembers required by the operating rules for which certification is requested, can be evacuated from the airplane to the ground under simulated emergency conditions within 90 seconds. Compliance with this requirement must be shown by actual demonstration using the test criteria outlined in appendix J of this part unless the Administrator finds that a combination of analysis and testing will provide data equivalent to that which would be obtained by actual demonstration.

14 CFR Appendix J to Part 25

The following test criteria and procedures must be used for showing compliance with § 25.803:

(a) The emergency evacuation must be conducted with exterior ambient light levels of no greater than 0.3 foot-candles prior to the activation of the airplane emergency lighting system. The source(s) of the initial exterior ambient light level may remain active or illuminated during the actual demonstration. There must, however, be no increase in the exterior ambient light level except for that due to activation of the airplane emergency lighting system.

- (b)** The airplane must be in a normal attitude with landing gear extended.
- (c)** Unless the airplane is equipped with an off-wing descent means, stands or ramps may be used for descent from the wing to the ground. Safety equipment such as mats or inverted life rafts may be placed on the floor or ground to protect participants. No other equipment that is not part of the emergency evacuation equipment of the airplane may be used to aid the participants in reaching the ground.
- (d)** Except as provided in paragraph (a) of this appendix, only the airplane's emergency lighting system may provide illumination.
- (e)** All emergency equipment required for the planned operation of the airplane must be installed.
- (f)** Each internal door or curtain must be in the takeoff configuration.
- (g)** Each crewmember must be seated in the normally assigned seat for takeoff and must remain in the seat until receiving the signal for commencement of the demonstration. Each crewmember must be a person having knowledge of the operation of exits and emergency equipment and, if compliance with § 121.291 is also being demonstrated, each flight attendant must be a member of a regularly scheduled line crew.
- (h)** A representative passenger load of persons in normal health must be used as follows:
- (1)** At least 40 percent of the passenger load must be female.
 - (2)** At least 35 percent of the passenger load must be over 50 years of age.
 - (3)** At least 15 percent of the passenger load must be female and over 50 years of age.
 - (4)** Three life-size dolls, not included as part of the total passenger load, must be carried by passengers to simulate live infants 2 years old or younger.
 - (5)** Crewmembers, mechanics, and training personnel, who maintain or operate the airplane in the normal course of their duties, may not be used as passengers.
- (i)** No passenger may be assigned a specific seat except as the Administrator may require. Except as required by subparagraph (g) of this paragraph, no employee of the applicant may be seated next to an emergency exit.
- (j)** Seat belts and shoulder harnesses (as required) must be fastened.
- (k)** Before the start of the demonstration, approximately one-half of the total average amount of carry-on baggage, blankets, pillows, and other similar articles must be distributed at several locations in aisles and emergency exit access ways to create minor obstructions.
- (l)** No prior indication may be given to any crewmember or passenger of the particular exits to be used in the demonstration.

(m) The applicant may not practice, rehearse, or describe the demonstration for the participants nor may any participant have taken part in this type of demonstration within the preceding 6 months.

(n) Prior to entering the demonstration aircraft, the passengers may also be advised to follow directions of crewmembers but may not be instructed on the procedures to be followed in the demonstration, except with respect to safety procedures in place for the demonstration or which have to do with the demonstration site. Prior to the start of the demonstration, the pre-takeoff passenger briefing required by § 121.571 may be given. Flight attendants may assign demonstration subjects to assist persons from the bottom of a slide, consistent with their approved training program.

(o) The airplane must be configured to prevent disclosure of the active emergency exits to demonstration participants in the airplane until the start of the demonstration.

(p) Exits used in the demonstration must consist of one exit from each exit pair. The demonstration may be conducted with the escape slides, if provided, inflated and the exits open at the beginning of the demonstration. In this case, all exits must be configured such that the active exits are not disclosed to the occupants. If this method is used, the exit preparation time for each exit utilized must be accounted for, and exits that are not to be used in the demonstration must not be indicated before the demonstration has started. The exits to be used must be representative of all of the emergency exits on the airplane and must be designated by the applicant, subject to approval by the Administrator. At least one floor level exit must be used.

(q) Except as provided in paragraph (c) of this section, all evacuees must leave the airplane by a means provided as part of the airplane's equipment.

(r) The applicant's approved procedures must be fully utilized, except the flightcrew must take no active role in assisting others inside the cabin during the demonstration.

(s) The evacuation time period is completed when the last occupant has evacuated the airplane and is on the ground. Provided that the acceptance rate of the stand or ramp is no greater than the acceptance rate of the means available on the airplane for descent from the wing during an actual crash situation, evacuees using stands or ramps allowed by paragraph (c) of this appendix are considered to be on the ground when they are on the stand or ramp.