

Exits and Their Operation - Air Transport Cabin Emergency

FOREWORD

Changes in this revision are format/editorial only.

1. SCOPE:

The scope of this Aerospace Recommended Practice (ARP) is to provide design recommendations for passenger cabin entry doors, service doors, and emergency exits. The objective is to have a reliable system standardized to make operation of the exits simple, quick and obvious to all occupants under normal and emergency conditions and facilitate qualification of cabin attendants for different airplanes.

NOTE: It is not the purpose of this ARP to specify the design method or specific mechanism to accomplish the objectives.

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 and regulations unless a specific exemption has been obtained.

2.1 SAE Publications:

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

ARP503 Emergency Evacuation Illumination
ARP577 Emergency Placarding - Internal and External

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3. RECOMMENDATIONS:

3.1 General Recommendations:

- 3.1.1 All exits shall be operable from inside and outside the aircraft.
- 3.1.2 In addition to meeting the maximum operating force requirements of this ARP, the ability of an adequate sampling of those expected to operate the handles shall be demonstrated under normal and emergency conditions for each exit design.
- 3.1.3 Increasing cabin differential pressure shall act to increase the security and retention of the exit. Means shall be provided to open the exit in case of emergency with a cabin differential pressure of up to .25 psi (.173 N/cm²).
- 3.1.4 Means shall be provided to prevent inadvertent in-flight opening of the exit or opening of the exit by vibration or landing impact loads.
- 3.1.5 Consideration shall be given to the operation of the exits when the aircraft is not in its normal attitude. All possible landing gear failures and combinations of failures shall be examined. This consideration shall include the weight of the door, opening motion, etc.
- 3.1.6 It shall not be necessary to perform secondary operations such as unlocking stops, straps, bars or catches to open the exit under emergency conditions.
- 3.1.7 Consideration shall be given to the operation of the exit from both inside and outside the aircraft in the event of fuselage distortion or passengers pressed against the inside of the door.
- 3.1.8 Interior equipment, curtains or other items located near the exit shall be located and secured in order to prevent blockage of the exit if these items are displaced in a survivable crash. No portion of seats located adjacent to or overlapping an exit shall be able to block opening of the exit.
- 3.1.9 Exits which are power assisted shall have a backup means to enable manual opening of the exit from inside and outside the aircraft in the event of loss of power.
- 3.1.10 Means shall be provided on or adjacent to the exit to visually assess conditions outside the exit before opening the exit.

NOTE: See ARP 503 (Emergency Evacuation Illumination) for recommendations on interior and exterior illumination.

3.2 Detail Recommendations:

3.2.1 Door Opening Handle, Interior:

- 3.2.1.1 The same handle used for the normal opening of a door shall be used for opening the door in an emergency.

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3.2.1.2 The handle shall be located as follows:

- a. All side hinged doors - on the door.
- b. All upward translating doors - immediately adjacent to the door in an area away from seated passengers.

3.2.1.3 The range of motion of the hand grip on the handle through its full travel shall be between 30 inches (76 cm) and 55 inches (140 cm) above the floor.

3.2.1.4 The motion of the hand grip shall be in a plane parallel to or perpendicular to the door so as to provide the maximum mechanical advantage to assist in opening the door. The force required to operate the handle in an emergency, assuming loss of powered assistance, shall not exceed 45 pounds (200 Newtons) with no residual cabin differential pressure or 75 pounds (334 Newtons) with .25 psi (.173 N/cm²) cabin differential pressure.

3.2.1.5 The handle shall not restrict the usefulness of the exit opening in the event that the exit is for some reason limited to partial opening.

3.2.1.6 The hand grip shall be at least 4 inches (10.2 cm) wide and the initial movement of the hand grip shall be generally upwards.

3.2.1.7 The entire operation of the handle shall be a smooth continuous motion, with no abrupt changes in force or direction. Adequate hand clearance shall be provided throughout the handle travel, and the angle of rotation of the handle shall not exceed 180 degrees.

3.2.1.8 The hand grip shall not be hidden or obstructed by any cabin furnishings and shall contrast with the adjacent trim so as to enable locating the hand grip in dim lighting conditions.

3.2.2 Door Opening Handle, Exterior:

3.2.2.1 The range of motion of the hand grip through its full range of travel shall be between 30 inches (76 cm) and 55 inches (140 cm) above the door sill and the hand grip shall be at least 5 inches (12.75 cm) wide.

3.2.2.2 Provisions shall be made to allow opening of the door in spite of icing of the handle and release mechanisms.

3.2.2.3 Clearance shall be provided to allow gripping the exterior handle with gloved hands.

3.2.2.4 The force required to operate the handle shall not exceed 45 pounds (200 Newtons) with no residual cabin differential pressure or 75 pounds (334 Newtons) with .25 psi (.173 N/cm²) cabin differential pressure.

3.2.2.5 Operation of the exterior handle shall open the door and prevent deployment of the evacuation slide. If the door opens outward and is power assisted, operation of exterior handle shall not activate the power assist system.

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- 3.2.2.6 The exterior handle shall automatically return to the closed and stowed position if the door is closed from inside the aircraft.
- 3.2.3 Plug-Type Hatch Opening Handle - Interior:
- 3.2.3.1 The opening handle shall be located on and centered near the top of the hatch and shall be visible and accessible without moving any lids or covers.
- 3.2.3.2 The motion of the hand grip shall be inward and downward.
- 3.2.3.3 The hand grip shall be at least 4 inches (10.2 cm) wide.
- 3.2.3.4 The force required on the hand grip to open the hatch shall not exceed 45 pounds (200 Newtons) with no residual cabin differential pressure or 75 pounds (334 Newtons) with .25 psi (.173 N/cm²) cabin differential pressure.
- 3.2.3.5 If automatic deployment of an evacuation device such as a step, ramp, off-wing slide, etc. is provided, a means shall be provided adjacent to the opening handle to allow opening the hatch for servicing reasons without deploying the device.
- 3.2.4 Plug-Type Hatch Opening Handle - Exterior:
- 3.2.4.1 The handle shall be a hinged device measuring at least 5 inches (12.7 cm) wide.
- 3.2.4.2 Provisions shall be made to allow opening of the hatch in spite of icing of the handle and release mechanisms.
- 3.2.4.3 The force required to operate the handle shall not exceed 45 pounds (200 Newtons) with no residual cabin differential pressure or 75 pounds (334 Newtons) with .25 psi (.173 N/cm²) cabin differential pressure.
- 3.2.4.4 Opening the hatch from the outside shall automatically prevent deployment of any exterior evacuation device associated with that hatch.
- 3.2.4.5 The exterior handle shall automatically return to the closed and stowed position if the hatch is closed from inside the aircraft.
- 3.2.5 Door Mounted Evacuation Slide or Slide/Raft Arming Control:
- 3.2.5.1 The arming control shall be adjacent to the door opening control with the door handle in the closed position.
- 3.2.5.2 The arming control shall be designed and installed so as to distinguish it from the door opening control.
- 3.2.5.3 The control shall move right and left and have a positive force holding it in each terminal position.