

Passenger Train Emergency Systems - Follow-Up Notice of Proposed Rulemaking

Almost a decade ago, the Federal Railroad Administration (FRA) issued two regulations as part of a broad effort to promote the safety of passenger rail travel. FRA issued the Passenger Train Emergency Preparedness regulations (49 CFR Part 239) in May 1998, and the Passenger Equipment Safety Standards (49 CFR Part 238) in May 1999. Both rules contained requirements for emergency systems on passenger trains, in addition to other requirements such as for structural design and fire safety.

In issuing the rules, FRA recognized the possibility of making further enhancements to the requirements, and identified issues for future consideration. In 2003, the Railroad Safety Advisory Committee established the Passenger Safety Working Group (Working Group) to address these and other passenger train safety issues. In turn, the Working Group established smaller task forces, including the Emergency Preparedness Task Force (Task Force) to consider and recommend any necessary amendments to FRA's regulations for passenger train emergency preparedness and systems.

This Task Force effort led to the August 24, 2006 publication of a Notice of Proposed Rulemaking (NPRM) in the Federal Register (71 FR 50276) addressing passenger train emergency systems. The final rule was recently published on 1 February, 2008. This rulemaking furthers the safety of passenger train occupants through both enhancements and additions to FRA's existing requirement for emergency systems on passenger trains.

On December 11, 2007, the Working Group agreed upon Task Force recommendations for a follow-up rulemaking addressing remaining issues involving passenger train emergency systems.

American Public Transportation Association (APTA) Standards

As FRA was issuing comprehensive Federal standards for passenger train safety in the late 1990s, APTA was also developing and authorizing several complementary industry standards applicable to its commuter and intercity passenger railroad members. By design, three of these standards taken together represent an effective systems approach to enable passengers and train crewmembers to locate, reach, and operate emergency exits and thus facilitate safe evacuation in an emergency. These standards address emergency lighting, low-location exit path markings, and signage for emergency egress and access. While the standards contain specific requirements, they allow for flexibility in their application. The Task Force was charged with reviewing these standards and recommended revising them and then incorporating them by reference in their entirety into the Code of Federal Regulations.

With assistance from the Task Force, APTA revised these three standards to make them incorporable by reference and to take advantage of certain technological advances which allowed for some desired enhancements. Incorporation of these standards into Part 238 would extend their applicability to all commuter and intercity passenger railroads and make them enforceable.

Signage for Emergency Egress / Access

In February 1996, as a result of a near head-on collision between a MARC train and an Amtrak train in Silver Spring, Maryland, and subsequent fire, eight passengers died in one car. This incident raised concerns that at least some of the passengers in the MARC train tried unsuccessfully to exit via the emergency window exits. In an effort in part to address this and other issues related to this accident, FRA issued Emergency Order No. 20 (EO 20) soon thereafter. Among other things, EO 20 required commuter and intercity passenger railroads to mark emergency window exits and to test a representative sample of such exits periodically to ensure that they operate.

Railroads were quick to mark emergency window exits with photoluminescent materials that were available for this purpose at the time. Later, FRA's Passenger Train Emergency Preparedness regulations, issued in 1998, required that emergency window exits and door exits be conspicuously marked in luminescent material and that instructions for their use be provided. The regulations also required that windows and doors intended for emergency access by emergency responders for extrication of passengers be marked with retroreflective material and that instructions for their use be posted.

Since the issuance of EO 20 and the Passenger Train Emergency Preparedness regulations, significantly more effective photoluminescent materials have been developed and recent research has revealed that many of the signs originally installed in response to EO 20 are not performing well -- luminescence levels are very low and the duration is very short. Research has shown that placement of the materials relative to sources of illumination is key to proper performance of the signs. In addition, there are various other factors that affect the ability of occupants to read signs.

APTA's standard for signage for emergency egress and rescue access contains specific requirements for ensuring that (1) emergency signage and markings enable occupants to identify, reach and operate emergency exits, especially in conditions of darkness, and (2) rescue access signage and markings enable emergency responders to readily identify such locations and gain access into the cars. The standard takes advantage of recent research findings and technological advances in photoluminescence. It specifies design and performance criteria for sign systems and requires periodic testing of certain system components.

Although the APTA standard does not address emergency communication, the Task Force also recommended applying some of the criteria for photoluminescence marking specified in this standard to intercom systems.

Emergency Lighting

Although existing regulations for emergency lighting apply only to passenger cars ordered on or after September 8, 2000, or placed in service for the first time on or after September 9, 2002, incorporation by reference of the APTA standard for emergency lighting would extend applicability to all passenger cars by the year 2015.

Part 238 requires minimum illumination levels at doors, aisles, and passageways. The APTA standard

requires illumination of stairways, crew areas of multiple-unit (MU) locomotives and cab cars, toilets, and other areas as well.

Part 238 requires a “back-up power system” capable of operating in all equipment orientations within 45 degrees of vertical, as well as after the initial shock of certain collision or derailment scenarios. The car’s main car battery is considered an acceptable “back-up power system.” A main car battery is limited in its ability to provide power in equipment orientations greater than 45 degrees of vertical. Additionally, because such batteries are commonly at least partially located below the car body, it would not be unusual for the main car battery to be damaged in the event of a derailment and render the emergency lighting system inoperable as occurred in the MARC train cab car that was involved in the 1996 accident in Silver Spring.

With assistance from the Task Force, the APTA standard was revised to better address those situations in which an emergency lighting system may be most beneficial. For instance, in the event of a derailment resulting in rollover, the importance of situational awareness is heightened. Occupants are likely not in the same location as they were before the incident and, in conditions of darkness, are likely unaware as to where in the car they are located in relation to the nearest exit. For instance, two passengers in one of the coach cars of the MARC train in the Silver Spring accident stated that emergency lighting was not available following the accident and that this, coupled with one passenger’s injuries and the other’s loss of eyeglasses, made it more difficult to move in the darkness. The coach car’s tilted position contributed to their disorientation and hindered mobility as well. Post accident investigation revealed that the main car battery powering the emergency lighting had been damaged as a result of the derailment. The NTSB concluded that “[a] need exists for Federal standards requiring passenger cars be equipped with reliable emergency lighting fixtures with a self-contained independent power source when the main power supply has been disrupted to ensure passengers can safely egress” and issued recommendation R-97-17 to FRA, which reads as follows:

Require all passenger cars to contain reliable emergency lighting fixtures that are each fitted with a self-contained independent power source and incorporate the requirements into minimum passenger car safety standards.

The APTA standard now requires an independent power source within the car body and located no more than a half-car length away from the fixture it powers in the event the main car battery is not able to power the system. This system must be capable of operating in all equipment orientations.

The APTA standard contains additional design and performance criteria for batteries that are used as independent power sources. It also contains more rigorous requirements for periodic testing of batteries used as independent power sources.

Low-Location Exit Path Marking (LLEPM)

Smoke may aggravate emergency situations. Not only does the presence of smoke serve as an impetus for evacuating a passenger car, it also makes it more difficult to identify, reach and operate emergency exits, as occurred in the Silver Spring accident. Because smoke generally rises, illumination from conventional emergency lighting fixtures, operating as intended, may be obscured. In these situations, the most viable escape path is most visible at or near the floor.

Passenger railroads recognize that, in the majority of emergencies, the safest place for passengers and crewmembers is remaining on the train. Should evacuation from a particular car be required, the safest course of action for passengers and crew is normally to move into an adjacent car. This avoids or minimizes the hazards inherent with evacuating passengers onto the railroad right-of-way.

Although there are currently no Federal requirements for LLEPM in rail cars, in 1999 APTA issued a standard for LLEPM in passenger cars. LLEPM systems are intended to assist passengers and train crewmembers in identifying the primary exit path in an emergency, under conditions of darkness and/or smoke. The standard requires LLEPM systems to operate independently of the car's normal and emergency lighting systems for 1.5 hours.

Like the standard addressing emergency signage, the APTA LLEPM standard specifies design and performance criteria and requires periodic testing of certain system components.

The Task Force also recommended including a daily inspection requirement to ensure that LLEPM system components are in place.

Doors

In the event of an emergency situation requiring evacuation, doors are naturally the preferred means of egress from a passenger car. Existing regulations require that passenger cars ordered on or after September 8, 2000, or placed in service for the first time on or after September 9, 2002, have at least two exterior side doors, each providing a minimum opening of 30 inches by 74 inches.

Certain life-threatening emergency situations requiring rapid evacuation from the train may not allow safe egress from one side of the train due to the presence of fire or another hazard. In addition, if a passenger car has rolled onto its side, as has occurred in past incidents, egress from the side of the train against the ground would not be possible. Occupants and emergency responders would be able to use only the doors on the side off the ground for egress and access, respectively. To allow for evacuation via side door exits from any one side of the train when the other does not allow for safe passage, the Task Force recommended that of the minimum two exterior side doors currently required for new passenger cars, at least one such door be on each side of the car.

During its investigation of the 1996 accident in Silver Spring, Maryland, the NTSB identified problems with emergency egress from a passenger car and, following its investigation, recommended that FRA

“[r]equire all passenger cars to have either removable windows, kick panels, or other suitable means for emergency exiting through the interior and exterior passageway doors where the door could impede passengers exiting in an emergency and take appropriate emergency measures to ensure corrective action until these measures are incorporated into minimum passenger car safety standards.” (R-97-15.)

The Task Force gave thoughtful consideration to this NTSB recommendation and the issue of emergency egress broadly. In some passenger cars, exterior side and/or end doors are located in vestibule areas that are separated from the seating area(s) by an interior vestibule door. Such interior doors could be rendered inoperable due to structural deformation of the door or the surrounding structures following a collision or derailment. The Task Force recommended requiring a removable panel or window in each vestibule door for new passenger cars. In such cases, occupants could use a removable panel or window in the door to gain access from the seating area to the exterior doors in the vestibule.

After much deliberation, the Task Force recommended not to proceed with a similar requirement for end-frame doors at this time in light of concerns over the ability to add a panel or window of the door that is capable of being removed in an emergency yet able to meet FRA standards that require windows to be able to resist certain forces and keep out fluids as well. The Task Force also expressed concern regarding the fatal consequences that could result from unintentional misuse of the panels. FRA is conducting research regarding the feasibility of a removable panel / window that can meet the competing needs of crashworthiness and emergency egress, without creating an unacceptable risk for unintentional misuse.

Debriefing and Critique of Emergency Situations/Simulations

At the request of the United Transportation Union, the Task Force considered revising the existing requirements for debriefing and critique to clarify that train crewmembers should participate in the debrief and critique session that must be held within 60 days after a passenger train emergency situation or a full-scale simulation. The purpose of such sessions is to determine the effectiveness of the railroad’s emergency preparedness plans. The Task Force took into consideration existing practices at commuter railroads, which in some instances involve indirect crew participation in debriefing and critique sessions. For instance, a train master may interview crew members shortly after the incident and prepare a written report for use at the debriefing and critique session held thereafter.

The Task Force recommended that the pertinent rule text in Part 239 be amended to specifically note that, to the extent practicable, all on-board personnel, control center personnel, and any other employees involved in the emergency situation or full-scale simulation must participate in the session either in person or offsite via teleconference.

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