



Railroad Safety Advisory Committee



RSAC Engineering Task Force: Update on Activities

to

The 44th Railroad Safety Advisory Committee Meeting

May 20, 2011
Washington, DC

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Outline

- Background
 - Tier I Criteria and Procedures
 - ETF Task 2
 - 49 CFR Tier III
 - Status
 - Structural Crashworthiness, Occupant Protection, Glazing, Fire Safety, E-Prep Features, Suspension Performance
 - Schedule
 - Selected Research Activities
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Background

- Engineering Task Force Established by Passenger Safety Working Group, August 12, 2009
 - Tasked with Developing Technical Criteria and Procedures for Assuring the Structural Crashworthiness and Occupant Protection Performance of Alternatively-designed Equipment to be used in Tier I Service
 - ETF Retasked by PSWG, July 28, 2010
 - May Address Any Type of Equipment
 - e.g., conventional locomotives, high-speed power cars, cab cars, multiple-unit (MU) locomotives, and coach cars
 - May Address Any Safety Features of the Equipment
 - e.g., crashworthiness, interior occupant protection, glazing, emergency egress, and fire safety features
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Tier I Criteria and Procedures

- Reflects Substantial Change in Technology
 - 49 CFR 238 – Principally based on classical beam analysis and mechanics of materials (i.e., manual analyses) and non-destructive tests
 - C&P Report – Principally based on contemporary computer simulation tools, non-destructive tests, and destructive tests
 - Final report to be posted on FRA website by **TBD**
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ETF Task 2



- Objective: Develop Recommended Engineering Requirements for Assuring the Safety of Equipment to be used in 49 CFR Tier III Service
- Scope: All Safety Aspects of High Speed Equipment
 - Crashworthiness, Occupant Protection, and Glazing (ongoing)
 - Fire Safety and E-Prep Features (ongoing)
 - Suspension Performance (started)
 - Brake Performance (started)
 - Safety Appliances (planned)



CFR Tier III (draft)



- Tier III provides for sharing of rail infrastructure among various types of rail equipment
 - Tier III passenger equipment would be operationally compatible with rail equipment operating at speeds not exceeding 125 mph
 - Tier III provides for dedicated passenger rail service at maximum speeds up to 220 mph
 - Tier III passenger equipment would operate at speeds over 125 mph only in a dedicated environment
 - Some Tier III standards may be less stringent than those applied to Tier II (Acela) passenger equipment, but safe for the appropriate operating environment
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Structural Crashworthiness



- Consensus on most structural crashworthiness requirements in the ETF Criteria and Procedures Report
 - Fluid Entry proposal being reviewed by APTA
 - Passenger occupied end cars – acceptable to FRA for Tier III equipment
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Occupant Protection



- Passenger Seats
 - Seat Standard Workgroup (SSW) formed to develop recommendations
 - Adoption of UK Standard GM/RT 2100 under discussion
 - Develop technical comparison with APTA seat standard for effectiveness in compartmentalizing occupants, limiting injury, and keeping seats attached
 - Interior fixture attachment and luggage retention
 - FRA developing responses to APTA proposals
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Glazing



- Side Facing
 - Consensus on FRA Type I requirements

- Forward Facing
 - FRA considering industry proposal



Fire Safety



- Agreement in Principle on Alternative to Note 16 of Appendix B to Part 238
 - To protect against a fire source under and external to the vehicle, the floor assembly may be tested together with undercar design features that separate the vehicle from the fire source---i.e., skirts and bottom covers; and

E-Prep Features

- Consensus on Window Access: Pull out glazing strip or of breakaway glazing
 - Breakaway glazing acceptable with proper signage and compliance with FRA Type I requirements
 - Size of windows must either be as per current CFR or must have an equivalent emergency egress plan approved by FRA
 - Consensus on Emergency Door Release: No changes to current CFR requirements
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Suspension Performance



- Methodology proposed at March 31, 2011, meeting for evaluating suspension performance
- Simulate suspension response to select cases of Minimally Compliant Analytical Track (MCAT) for Class 1 – 5 track conditions



Schedule



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- Meeting #1—October 20 and 21, 2010 in Cambridge, MA
 - Railroad Reviews Equipment Considerations, CHSTP and FHSR
 - Supplier Reviews of Crashworthiness Features of HSR Equipment, Alstom, Bombardier, Kawasaki, Rotem, Siemens, etc.
 - Discussions of scenarios, structural crashworthiness, occupant protection, and glazing
 - Meeting #2—January 11 and 12, 2011 in Orlando, FL
 - Supplier Homework Results for Compliance with Tier I C&P Scenarios
 - Consensus on scope of scenarios, structural crashworthiness, occupant protection, and glazing
 - Meeting #3—February 14 and 15, 2011 in Washington
 - Discussions on seat requirements
 - Consensus on selected structural crashworthiness requirements
 - Meeting #4—March 30 and 31, 2011 in Washington
 - Formation of Seat Standard Workgroup
 - Consensus on most structural crashworthiness requirements
 - Meeting #5— June 16 and 17, 2011 in Cambridge
 - Target -> complete consensus on crashworthiness, occupant protection, and glazing
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Selected Research Efforts

- Structural Crashworthiness
 - Activities: Model crippling using the methodology laid out in the C&P, and perform a quasi-static crippling test (not required by C&P)
 - Purpose: Validate C&P methodology to provide technical basis for potential regulations
- Occupant Protection
 - Activities: Parametric study of the influence of train makeup, collision speed, and force/crush behavior on high-speed train crash pulse
 - Purpose: Facilitate assessment of GM/RT 2100 and/or development of high-speed train seat specification
- Glazing
 - Activities: Development of techniques for analyzing glazing impacts
 - Purpose: Facilitate development of robust qualification test techniques; Make possible rapid evaluation of the influence of glazing characteristics on impact performance