Specification Evaluation Criteria - Bi-Level Intercity Car: Rev. A

Introduction

The Next-Generation Equipment Committee (NGEC) was established under the provisions of section 305 of the Passenger Rail Investment and Improvement Act of 2008 (PRIIA). This legislation tasked the Committee with the responsibility for creating procurement specifications for standardized next-generation intercity corridor equipment, as well as other responsibilities related to rolling stock procurement. Under the PRIIA 305 language, the Committee may also determine the number of types of equipment required, taking into account variations in operational needs and corridor infrastructure.

A technical subcommittee was created specifically to develop and evaluate passenger rail car and propulsion system designs and technologies, evaluate proposed vehicle subsystems, and establish performance and safety criteria standards. Subsequent discussions and meetings of the technical subcommittee developed additional objectives for the specification development process:

- Coordination with a National Fleet Strategy
- Accommodation of the needs of individual States and other operators
- Flexible deployment through standardization of clearances and environmental conditions
- Maximizing seating capacity
- Establishment of maximum operating speeds and track class/geometry requirements
- Minimize time and costs of turning trains at terminals (push-pull) and enable mid-route consist size changes
- Minimize station dwell times
- Maximize reliability and ease of maintenance
- Ensure equipment compatibility
- Compliance with safety objectives, including crashworthiness, energy absorption, structural strength, emergency egress
- Modularity and ease of configuration changes to meet the needs of individual States

Consistent with the NGEC mandate, and the objectives of the technical subcommittee, the PRIIA 305 Bi-Level Specification is intended for use to procure, design and manufacture a fleet of intercity rail cars for use in intercity corridor service throughout the United States where operational conditions permit.

Based on the design objectives identified by the technical subcommittee, the Committee should request that a report be provided by the technical subcommittee that addresses the specific design objectives and requirements, that confirms compliance with all mandates, and that summarizes the Bi-Level Specification in a manner that provides the Committee the information necessary for the Committee to determine that the Specification complies with all requirements and is ready for acceptance. An outline for the content to be provided in this report is attached to this document.

History and Development of the Bi-Level Intercity Car Type

The bi-level corridor car is not a new concept – Amtrak and the State of California have been successfully operating a fleet of intercity bi-level cars in corridor service throughout California since 1995. The bi-level "*California Car*" was an evolutionary design derived from Amtrak's *Superliner* cars, but with numerous design changes that made the *California Cars* more

suitable to the demands found in a corridor service environment – high-volume passenger loading and unloading, amenities suitable for trips of up to 12 hours in length, trainline-controlled doors and boarding from platforms 8 inches above top of rail.

The concept for the bi-level intercity corridor car originated with the passage of propositions 108 and 116 in California in 1992. These propositions provided close to $3 billion for the development of urban, commuter and intercity rail and transit projects in California. Proposition 116 directed Caltrans to develop specifications for standard, state-of-the-art passenger cars and locomotives to be used throughout California. The requirement included the mandate for standardization and interchangeability of cars, systems and components, to reduce maintenance and spare arts costs. This fleet acquisition ultimately consisted of 9 F59PHI locomotives and 66 bi-level cars, built by Morrison Knudsen in four configurations: coach, cab control coach, coach-baggage and food service.

The *California Car* Specification was based on a number of design concepts:

- The design was developed to provide comfortable, high-capacity rolling stock that facilitated efficient loading and unloading, and numerous passenger amenities oriented towards corridor-style service.
- A bi-level design was chosen for compatibility with Amtrak's *Superliner* cars, and to take advantage of low-level boarding at station platforms without requiring traps, stepboxes or high-level platforms.
- Two vestibules, each equipped with twin bi-parting, trainline-controlled power side doors permitted multiple entry points controlled by one crewmember. Two straight staircases allowed passengers easy access to the upper level of the train, where most seating and car-to-car pass-through is located. Seating for mobility-impaired passengers is on the lower level. This efficient loading and unloading system decreased station dwell times and overall end-to-end running times, and allowed for high-volume passenger ingress and egress without increasing on-board crew size.
- Adherence to existing Amtrak standards for *Superliner* equipment, including clearances, track geometry, trainline connections and all required functional compatibility allowed the *California Cars* to operate in mixed trainsets with *Superliners* and ex-Santa Fe high-level cars, and to be deployed on all routes where *Superliners* are cleared to operate.
- Passenger accommodations were specified to maximize safety, comfort, convenience and service.
- Cars are required to be compatible with current Amtrak equipment, in terms of coupling mechanically, electrically, pneumatically and safely.
- Access and circulation – attractive and functional and comfortable, and facilitate access to and circulation within the train.
- Ease of cleaning and maintenance, access to equipment, conformity to Amtrak standard maintenance intervals, and human factors.
- Major systems, components and parts shall be as interchangeable as possible.
- All car amenities shall be in accordance with the Americans with Disabilities Act of 1990.

In 1998, Amtrak advanced the bi-level corridor car design through its *Surfliner* car procurement, which used the *California Car* as a design base with incremental improvements for passenger amenities, maintainability and operations. The *Surfliners* are functionally compatible with *Superliners* and *California Cars*. With Amtrak's purchase of 40 *Surfliners* and California's acquisition of an additional 22 *Surfliner* cars, the total bi-level corridor fleet is now at 127 cars, deployed on the *Pacific Surfliner*, *San Joaquin* and *Capitol Corridors* in California.

Operational Considerations

The primary consideration of the PRIIA 305 Bi-Level Specification should be the adequacy of the Specification in addressing the operational considerations needed to procure, design and build a fleet of intercity cars that will be:

- Designed for use without restriction under a wide spectrum of environmental and physical conditions that are found throughout the United States;
- Specified in configurations and containing features to allow potential users of these cars to create new fleets of equipment for establishment of new services, replacement of existing equipment, or addition of new cars to existing fleets without major impact;
- Designed and built to meet the needs of the traveling public, the operations and maintenance providers and the passenger rail agencies by creating attractive, safe equipment that is reliable, cost-effective, maintainable, easy to operate and durable; and
- Operationally and functionally compatible with existing bi-level cars.

The technical subcommittee has conducted a survey of potential users of this equipment to determine what, if any, operational restrictions may have an effect on the development of this Specification. The basis for the clearance analysis was Amtrak's standard bi-level clearance diagram (drawing B-066-00050, rev 1), which delineates the static and dynamic outline of the bi-level cars currently in use on Amtrak-provided services (*Superliners*, *California Cars* and *Surfliners*). The PRIIA 305 bi-level car as specified is not intended for use in services that utilize high-level (48 in above top of rail) platforms for all or some of their stations, as these platforms are not compatible with the lower-level boarding system of the bi-level cars.

The PRIIA 305 cars must be designed and built so that they can be integrated into an existing fleet of bi-level cars with minimal impact on the existing fleet, as well as be able to create a stand-alone fleet of cars for the purposes of starting new services, replacement of existing fleets and placement of new trainsets into service.

- Will these cars be operable without restriction in the United States (except locations with restricted clearances and high-level platforms)?
- Has the technical subcommittee identified all locations and/or conditions that restrict, affect or prevent the operation of these cars, based on feedback received from the States? What is the proposed resolution for these locations and/or conditions?
- Does the Specification identify all environmental and operational requirements necessary to assure the car's performance as specified throughout the United States?
- Will this Specification create a fleet of PRIIA cars that can be operable either as a new fleet, or be integrated into an existing fleet of cars?
- Are the cars functionally compatible with existing fleets of bi-level cars and intercity locomotives?
- Will there be an impact to an existing fleet of bi-level cars when the PRIIA cars are delivered and commissioned into service?
- Are all necessary configurations and special purpose cars included in the Specification so that users can order all the car types they may need for new services, additional frequencies and fleet expansions?

Design Considerations

There are many design requirements that go into a specification of this size and complexity, whether through identification of specific system design technology or through identification of performance-based system requirements. The Committee's evaluation of the Specification

should focus on the Specification's compliance with the Committee's mandates and stated objectives, as well as additional requirements such as compliance with regulations regarding safety, accessibility and operations.

- Does the Specification meet the safety objectives of the PRIIA 305 Committee, the FRA, Amtrak and the States?
- Does the Specification meet requirements for maximum operating speed, braking, track geometry, cant deficiency, etc?
- What is the revenue seating capacity of the proposed car types? How does this compare to similar cars now in service?
- Are the cars compliant with the applicable provisions of ADA~~?~~**, including following requirements that exceed the minimums of 49CFR38:**
  - **§113(b) by increasing the minimum longitudinal width of a vestibule to 44 inches from 42 inches in cases where persons in mobility aids heading to an accessible doorway 32 inches wide must traverse the vestibule.**
  - **§125(b)(1) by having a minimum design lift capacity of 800 lbs. as opposed to 600 lbs,**
  - **§125(b)(6) by having a minimum clear length of 54 inches, as opposed to 48 inches measured from 2 inches above the surface of the platform to 30 inches above the surface,**
  - **§125(b)(9) by measuring lift platform deflection with a load of 800 lbs. as opposed to 600 lbs. and**
  - **§125(d)(2) by increasing the size of the seating/storage location of an occupied/unoccupied wheelchair or mobility aid to 59 inches by 32 inches from 48 inches by 30 inches?**
- Do the cars as specified have the amenities that passengers request most often?
- Will the design of the cars allow for individual variations that individual States may need for their operations?
- How do the passenger and crew amenities on these cars compare to those found on existing rail equipment?
- Do the cars use interior space efficiently, providing a balance between the need for revenue seating and the other uses of space such as luggage storage, trash and recycling, bicycle storage, etc?
- Does the Specification contain objectives for the reliability and maintainability of the cars? Are the reliability and maintainability provisions measurable and obtainable?
- Does the Specification contain adequate provisions for design verification testing, as well as quality assurance testing?
- Are there adequate provisions in the Specification for Customer participation in the design review, production inspection and acceptance of the new cars?
- Does the Specification promote environmentally sensitive initiatives, such as energy efficiency, waste reduction and recycling?

Summary of the PRIIA 305 Bi-Level Specification

The Specification for the PRIIA 305 bi-level intercity car will be a detailed technical document that is several hundred pages in length. In order for the Executive Committee and potential users to evaluate the overall Specification and the major systems and design considerations of the proposed cars, the Specification should include a summary document that describes the basic concept and features of the equipment.

Specification Development and Approval Process

The process by which the Bi-Level Specification was developed, reviewed and approved in preparation for submittal to the Executive Committee is almost as important a component of the PRIIA 305 Committee's mandate and mission as is the specification that the Committee will approve. The adequacy of the Specification is determined by its technical merit as well as by the soundness of the process by which it was created. The makeup of the Committee and the technical subcommittee, the methodology by which a specification was developed, reviewed, edited and approved by the subcommittee, and the documentation of the process and the Committee makeup will provide the Executive Committee with means by which it may determine if the Specification was developed using sound procedures, and will create a lasting record of the way the Specification was written and finalized.

- Who was involved in the development and approval of the Specification, and who did they represent?
- What organizations were the major participants and what role did they play?
- What was the process for development, review and approval of the Specification?
- How were comments evaluated?
- Was the Specification approved by consensus vote?

FRA-Specific Issues Regarding this Specification

It is assumed that this Specification will not only be used to acquire and operate rail cars that are compliant with all applicable FRA regulations and safety standards, but that this Specification will also form the basis for grant applications for rolling stock procurement funding under a variety of Federal funding programs. The establishment of the PRIIA 305 equipment standardization process has given the intercity rail passenger community an opportunity to create a sustainable rail car design, and current Federal funding programs point back to the PRIIA 305 Committee as a requirement for funding of intercity rail rolling stock acquisitions. Therefore, it is essential that the FRA's consent and approval of this Specification be achieved and documented; so that potential users of this Specification can be assured that the car as specified meets the FRA's intent both for design and procurement as well as for funding and grant application.

- Has the FRA approved this Specification in its current form?
- How will this approval be documented?
- Will the FRA support the use of this Specification for rolling stock acquisition using federal funds (PRIIA/HSIPR funds, and other potential funding sources)?
- Is this Specification fully compliant with all applicable regulations**, and does it meet the specific "greater than minimum" requirements listed in Design Considerations**? Will waivers of any sort be required in order for these cars to be built as specified?

Attachment

Bi-level Car Specification Summary Report (to be provided by the technical subcommittee):

1. Describe how the base specification was developed, what was used as a starting point and how this conforms to the needs and objectives as determined by the Committee and technical subcommittee.
2. Clearances and deployment
   - 2.1. Provide assessment of the extent to which these cars will be operable without restriction in the United States.
     - 2.1.1. Identify all locations and/or conditions that restrict, affect or prevent the operation of these cars, based on feedback received from the States. Describe the proposed resolution for these locations and/or conditions.
     - 2.1.2. Summarize how the Specification identifies all environmental and operational requirements necessary to assure the car's performance as specified throughout the United States.
3. Fleet considerations
   - 3.1. Will this Specification create a fleet of PRIIA cars that can be operable either as a new fleet, or be integrated into an existing fleet of cars?
   - 3.2. Describe how the cars shall be functionally compatible with existing fleets of bi-level cars and intercity locomotives. Include a discussion of trainlines, HEP loads, operational compatibility and consistency of maintenance.
   - 3.3. Describe any potential for impact (such as the requirement for modifications) to an existing fleet of bi-level cars when the PRIIA cars are delivered and placed into service.
   - 3.4. Identify the Specification provisions for all necessary configurations and special purpose cars included in the Specification so that users can order all the car types they may need for new services, additional frequencies and fleet expansions.
     - 3.4.1. Coach cars
     - 3.4.2. Cab control cars
     - 3.4.3. Cars that provide food service
     - 3.4.4. Business class
     - 3.4.5. Secure, dedicated space for checked baggage
     - 3.4.6. Storage for bicycles
   - 3.5. Describe the way in which the Specification allows for variation in the cars design to accommodate the needs of individual States or other customers.
4. Safety objectives
   - 4.1. Document the Specification's compliance with the safety objectives of the PRIIA 305 Committee, FRA, Amtrak and the States.
     - 4.1.1. Describe how the objectives for the safety-related features of the Specification were determined
     - 4.1.2. Describe how this Specification represents an advancement of safety.
     - 4.1.3. Provide a summary of compliance with all applicable safety regulations and standards.

5. Performance requirements

5.1. Confirm that the cars shall be capable of revenue operation at speeds up to 125 mph (assuming all track quality and certification issues are addressed), under existing Tier 1 equipment requirements.

5.2. Describe the braking rate specified for the new cars, and how this compares to existing bi-level cars.

5.3. Revenue seating capacity

5.3.1. Describe the revenue seating capacity of the proposed car types.

5.3.2. Provide a comparison to similar cars now in service.

5.4. Accessibility

5.4.1. Provide documentation that the cars are fully compliant with the applicable provisions of ADA

5.4.2. Provide documentation that the cars comply with the "greater than minimum" requirements listed under "Design Considerations."

6. Passenger amenities

6.1. Provide a comparison between the amenities on the PRIIA cars as compared to those found on existing rail equipment.

6.2. Describe how the cars use interior space efficiently, providing a balance between the need for revenue seating and the other uses of space such as luggage storage, trash and recycling, bicycle storage, etc.

7. Reliability and maintainability

7.1. Describe the Specification objectives for the reliability and maintainability of the cars, and the means by which they are measurable and obtainable.

8. Testing and Inspection Requirements

8.1. Provide a summary of the Specification provisions for design validation testing, as well as quality assurance testing.

8.2. Provide a summary of the provisions in the Specification for Customer participation in the design review, production inspection and acceptance of the new cars.

9. Environmental Initiatives

9.1. Describe how the Specification promotes:

9.1.1. Energy efficiency

9.1.2. Use of sustainable or recycled materials, and lessen the impact from the manufacturing process

9.1.3. Capture of recyclables from the passenger waste stream

9.1.4. Environmental sustainability of materials such as refrigerants

10. Describe the process by which the Specification was developed.

10.1. Provide a list of those individuals involved in the development and review of the Specification, including their affiliation.

10.2. Describe the organization of the subgroups, and their responsibilities regarding review of the Specification.

10.3. Describe the criteria that were used to evaluate comments from the subgroups, and

how the comments were dispositioned.

10.4. Describe the roles of the major groups involved:

- Amtrak
- FRA
- APTA
- States
- Industry and consultants.

10.5. Summarize other stakeholder involvement.

10.5.1. Describe the process by which the public and other stakeholder groups were able to have input into this Specification.

10.5.2. List the features most frequently requested by passengers that have been incorporated into the Specification.

10.6. Describe the process by which the technical subcommittee finalized the Specification for presentation to the Executive Committee.

10.6.1. Specify the method by which the Specification was approved. Include a discussion of any dissenting votes or issues of disagreement.