AAR

Current EEC Key Topics
On-line Publications
FCFTF Update
NGFT TF Update
Passenger Stds Update

David L. Cackovic
Key EEC Topics

David L. Cackovic
Jon Hannafious
Changes Related to DOT-117 Tank Car Regulations

♦ Retrofitted tank cars may have weight increases from:
  ● Jacketed and thermally insulated shells
  ● Full-height half-inch-thick head shields
  ● Rollover protection for top fittings
  ● Possibly from safety appliance walkways

♦ Increased weight will require many cars to undergo Rule 88 - Mechanical Requirements for Acceptance - “Increased Gross Rail Load” Process (IGRL)
Changes Related to DOT-117 Tank Car Regulations

♦ Rule 88 Minimum Mechanical Requirements Chart

- Wheelsets must comply with S-286 - Free/Unrestricted Interchange for 286,000 Lb. Gross Rail Load Cars:
  - S-286 – Currently requires New Wheels and Axles

♦ ARCI Requested Waiver for the following
- Cars already equipped with 6 ½ x 9 bearing wheelsets, request was to leave them on the retrofitted car
  ▲ EEC determined that a minimum of reconditioning would be required
- Requested the use of reconditioned wheels and axles as needed for any DOT-117 IGRL Cars
Changes Related to DOT-117 Tank Car Regulations

♦ EEC/TSWC opted for edits to S-286 and Rule 88 (Both in Progress)

♦ S-286 Edits:
  ● Bearings – No change. “New” was/is not mentioned, implies new or reconditioned
  ● Axles – Removal of the statement that axles must be new.
  ● Wheels - Removal of the word “new” for 36” and 38” wheels.

2.3 Bearings
The bearing size of 6½ x 9, 7 x 9, or 7 x 12 is to be applied.

2.4 Axles
The axle size of 6½ x 9, 7 x 9, or 7 x 12 is to be applied. Axles shall be new. Axles with machined grooves at the inboard seal wear ring/journal contact area shall not be used.

2.5 Wheels
Wheels are to be new 36-in. mounted on 6½ x 9 axles and bearings or new 38-in. mounted on 7 x 9 or 7 x 12 axles and bearings. Wheels are to be curved plate, Class C.
Changes Related to DOT-117 Tank Car Regulations

♦ Rule 88 Edits

- Rebuild, Increased Gross Rail Load, and Increased Life Status are being changed to allow reconditioned wheels and axles
- New cars must continue to use new wheels and axles
- New and reconditioned axles must be ultrasonically tested

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>SPECIFICATIONS</th>
<th>RB</th>
<th>NW</th>
<th>MOD</th>
<th>EXS</th>
<th>IGRL</th>
<th>ILS</th>
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<td>(21) Wheels and Axles</td>
<td>(a) Units must be equipped with heat-treated curved-plate wheels.</td>
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<td>(b) Units must be equipped with AAR-approved raised wheel seat design axles.</td>
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<td>(c) Units with 4-wheel trucks and a gross rail load greater than 268,000 pounds up to and including 286,000 pounds intended for free/unrestricted interchange must be equipped with wheels and axles in compliance with Standard S-286. Axles must be ultrasonically tested in accordance with AAR specification M-101 (for new) and Specification S-659 (for reconditioned).</td>
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Reflectorization of Freight Cars (& Locomotives)

♦ Deadline of November 28, 2015 is approaching for initial application of reflective material. Application period began in 2005.

♦ Most recent AAR Announcements
  ● July 6, 2011 (C-11476):
    ▲ All new and rebuilt must immediately have reflectorization reported, mandatory.
    ▲ Cars built/rebuilt after Jan. 1, 2006 must be reported, mandatory on January 1, 2012.
    ▲ Reminder that all cars must comply by November 28, 2015
  ● Nov. 15, 2012 (C-11818): Rule 66 Modified to notify car owner when Umler Field is empty, and owner will be given 6 months to comply
  ● July 17, 2013 (C-11990): Reminder of July 6, 2011 Circular
  ● May 21, 2014 (C-12160): Solicitation of comments for Rule 66 edit to make initial application a Cause for Attention at any time. Rule released in July
  ● Nov. 3, 2014 (MA-0152): Maintenance Advisory with a list of 315,000 cars with no reflectorization information in Umler
  ● July 1, 2015 (EW-5299): Early Warning released with remaining 126,893 cars

♦ November 28, 2015: Freight Cars without initial application of reflective material will not be in compliance with Federal Regulations and car owner would be subject to penalty
Reflectorization of Freight Cars (& Locomotives)

♦ Proposed Rule 66 – Reflective Sheeting

RULE 66 – REFLECTIVE SHEETING

A. Wear Limits, Gaging, Cause For Renewal, Cause for Attention

1. At any time
   a. Initial application of reflective sheeting (see E.13)
   b. When a Single Car Air Brake Test (SCABT) is performed on cars with reflective sheeting previously applied, reflective sheeting must be inspected for:
      1. Missing pieces of reflective sheeting
      2. Damaged or obscured reflective sheeting
      3. Fire or heat damage
      4. Improperly located or applied reflective sheeting
      5. Sheeting obscured with dirt or grime such that the reflective properties are diminished must be cleaned or replaced
Reflectorization of Freight Cars (& Locomotives)

♦ Federal Regulations require replacement of all reflective material at time of the Single Car Air Brake Test (SCABT) subsequent to the material becoming 10 years old

♦ A waiver request has been submitted to the FRA requesting 3 years for AAR member railroads to do the following:
  ● Develop a standard for a comparative panel based method including evaluation procedures and a training program/materials
  ● Inspect the retroreflective sheeting on rail cars at time of the SCABT
  ● Inspect the retroreflective sheeting on locomotives at the annual inspection
  ● Replace “grandfathered” material during the SCABT or annual locomotive inspection
  ● When completed, AAR member railroads will provide training to their employees who will be conducting the tests and will make the training materials and records available to FRA upon request
Stencil Reductions

♦ EEC has developed a list of over 90 stencils/requirements to consider for removal
  ● Most of those being considered have fields in Umler

♦ The following have been removed from the Rules, S-910 in Progress (Lettering and Marking of Cars)
  ● Consolidated stencils (white borders and black background)
  ● Brake valve information
  ● Tread Conditioning Brake Shoe (Removed in 2014, remains an option of the car owner)

♦ The following are considered for removal next
  ● Truck Mounted Brake Cylinder – (Rules 4 and 80)
  ● Truck Mounted Brake Cylinder Maintenance – (Rules 4 and 80)
  ● Any remaining mention of stencils for Composition, High Friction Composition, and Tread Conditioning Brake Shoes – These are already in Umler (Standard S-910 and Rule 6)
  ● Cushioning Device Stencil – Need Umler permissible values update
Truck Performance for Rail Cars

♦ EEC has approved a revision to M-1001 Design, Fabrication, and Construction of Freight Cars, Chapter 11 Service-worthiness Tests And Analyses For New Freight Cars
  ● Loaded Hunting is being added to the menu of items for testing

♦ M-976 Truck Performance for Rail Cars will be edited to reference the Chapter 11 loaded hunting test as an option

♦ EEC is considering a new test to replace the resistance testing now conducted under M-976. Test has been termed “Traction Ratio Test”
  ● Proof of the concept is still underway at TTCI under the AAR’s Strategic Research Initiative program.
  ● Requires the use of instrumented wheelsets to determine the “traction ratio”
  ● Requires the use of a baseline truck for comparison
  ● The new method hopes to overcome variables that occur in nature (wind, friction levels, etc.) and requires extra attention on variables that can be controlled.
WELCOME TO THE AAR MSRP LIBRARY

To get started select the MSRP that you wish to review. From there you can download each MSRP, individual specifications and related documents.

This library is currently in beta and we would appreciate your feedback on the functionality and user experience of this library tool.

Submit Feedback

Select MSRP

Select MSRP
## AAR On-line MSRP System, Other Work in Progress

### Select MSRP

**MSRP-C II: Design, Fabrication, and Construction**

*Design, Fabrication, and Construction of Freight Cars (04/13/2011)*

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<tr>
<th>DOC NO.</th>
<th>IMPLEMENTED FILE</th>
<th>CIRCULAR</th>
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<td>M-1001 Ch 8</td>
<td>M-1001 Chapter 8 - Design and Test Requirements for Trailer/Container Transport Cars (04/13/2011)</td>
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CHAPTER 7. FATIGUE DESIGN OF NEW FREIGHT CARS

7.1 Administrative Provisions

7.1.1 Purpose and Scope

7.1.1.1 General

This specification is the requirement for fatigue analysis of freight cars and is not intended to supersede or make obsolete any existing AAR design requirement. In general, existing specifications are concerned with static and high-impact loads. However, when a member or connection is subjected to fluctuating stresses, failure can occur under stresses considerably lower than those that would cause failure under steady conditions. This specification gives the designer or analyst a method for estimating the fatigue life of a freight car or component when subjected to fluctuating stresses. The accuracy of fatigue analysis is, however, not as high as that of static stress analysis. While fatigue analysis methods give an indication of the adequacy of the design from a fatigue viewpoint, the actual life estimates must be utilized with caution. The intent of the specification is to ensure that all car builders uniformly utilize best practices for fatigue analysis.

The purpose of this fatigue design specification is to provide assurance that a proposed car design, or a current design with structural modifications not contemplated in the original design (and fatigue analysis), will meet the high utilization or full-interchange mileage criteria specified below.

In addition to the basic strength requirements for modifications or “new appurtenances” discussed in paragraph 1.2, a determination of satisfactory fatigue life of the modification is required. Gener
“My evaluation has been very favorable. Everything was worked fine and I made a point to open every standard. The only suggestion I have for improvement would be to have hyper links where references are throughout the standards. Although I know this would be labor intensive."

“So far it seems to be working fine. This will be a big help to me. “

“I recommend you move that dropdown above the comments area.“

“I like the simplicity of the format and the fact that multiple documents can be open….“

“It may be my system, where I am operating by VPN through my company's server which is in another town, but the site crashed and immediately recovered several times."

“I'm in favor of eliminating or reducing the top banner size.“

“I like the alternating row color; it is a good visual aide.“
PATH FORWARD

1 Schedule bi-weekly Web Cast Meetings to continue progression
2 AAR to address how to pay for systems development
3 List of Publications Products and formats (where we want to go)

<table>
<thead>
<tr>
<th>DRM On-line Subscription</th>
<th>PDF Download</th>
<th>CD</th>
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<td>Circular Letters</td>
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<td>four times a year</td>
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4 Get list of pub customer names to Railinc, to determine company name, ID, and type (needs to match)
   - For Tech Stds Customers
   - For BOE Customers
   - For DPLS Customers
**PATH FORWARD**

5 FM/OM continue to develop (concept):

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<th>Four tiered approach for FM/OM</th>
<th>Shared pro-rata</th>
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<td>Class I Pro-Rata (xx% of FM/OM)</td>
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<td>All non-Class I Car Owners -- Car Count</td>
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<td>Running Repair Agents</td>
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<td>Contract Shops / Other</td>
<td>Special Fee</td>
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<td>Specials (i.e. Railway Education Bureau)</td>
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</table>

System to minimize and control number of hard copies

Develop DRM Needs

6 MSRPs

Future calls come up with concepts

Continue to test online system

By Sept 2015, schedule call with beta testers

7 BOE 6000, develop:

System to minimize and control number of hard copies
AAR Fatigue Task Force Update
The FCFTF is Working with EEC:

1. New Well Car Data Approval to Publish
   1. Well Car Longitudinal Coupler Force
   2. 40-foot Tank Style Container Loads
2. Republish data removed in 2010
3. Next Field Test – Crude by Rail (CBR)
4. Coupon Testing
AAR Fatigue Task Force Update

New Well Car Data Approval to Publish
Well Car Longitudinal Coupler Force
New Well Car Data Approval to Publish
40-foot Tank Style Container Loads

Force for four corners of a 40-foot tank style container

Q1SX, Quadrant 1 Longitudinal Force into Tank Container
Q2SX, Quadrant 2 Longitudinal Force into Tank Container
Q3SX, Quadrant 3 Longitudinal Force into Tank Container
Q4SX, Quadrant 4 Longitudinal Force into Tank Container

Q1SY, Quadrant 1 Lateral Force into Tank Container
Q2SY, Quadrant 2 Lateral Force into Tank Container
Q3SY, Quadrant 3 Lateral Force into Tank Container
Q4SY, Quadrant 4 Lateral Force into Tank Container

Q1SZ, Quadrant 1 Vertical Force into Tank Container
Q2SZ, Quadrant 2 Vertical Force into Tank Container
Q3SZ, Quadrant 3 Vertical Force into Tank Container
Q4SZ, Quadrant 4 Vertical Force into Tank Container
Republish data removed in 2010
December 22, 2010, EEC issued C-11354

“Replacement of 19 fatigue spectra data files for gondola and hopper cars with 6 new data files obtained in the new test program. These data are more pertinent to today’s operations for hopper and gondola cars.

Replacement of 10 fatigue spectra data files for tank cars with 12 new data files obtained in the new test program. These data are more pertinent to today’s operations for tank cars.

Addition of 3 new fatigue spectra data files for 5-unit intermodal cars.”
The Next FCFTF Test will be to Obtain Load and Design Spectra for CBR Railcars

- 10,000 miles
- Unit train service
- Longitudinal and vertical coupler force
- Bolster, centerplate and side bearing forces into carbody structure
### AAR Fatigue Task Force Update

#### Coupon Testing

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<th>Fig. No.</th>
<th>Description of Member</th>
<th>Member Details</th>
<th>Nom. Yield Stress (ksi)</th>
<th>Stress Range (ksi) at $2 \times 10^6$ cycles ($S_r$)</th>
<th>S-N Slope ($k$)</th>
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**Fig. 7.1** Idealized S-N diagram

**Equation of MGD curve:**

$$S_{max} = m S_{min} + b$$

$$S_{min} = \frac{S_{max} - b}{m}$$

**Fig. 7.2** Idealized modified Goodman diagram
The purpose of the analysis is to find out the most suitable plate dimensions for the potential experimental fatigue tests. Find out the effect of geometry on the stress distribution; this can be beneficial in developing standards/guidelines for finding the approximate location of stress sampling points when the analyst is looking for the nominal stresses in a complicated railcar structure.

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<thead>
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Association of American Railroads
Safety and Operations Department

Natural Gas Fuel Tender TAG
Draft M-1004 Specification for
INTEROPERABLE NATURAL GAS FUEL TENDERS

July 15, 2015
1.3 Organization of this Specification

This Specification is organized into the following Chapters and Appendices:

Chapters

1.0 Introduction / General Requirements
2.0 LNG Fuel Tank Requirements
3.0 Reserved (CNG Fuel Tank)
4.0 Reserved (Other Alternate Fuel Tank)
5.0 Piping, Service Equipment, & Protective Housings
6.0 Tender Control Unit
7.0 Locomotive Interface
8.0 Fueling Station Interface
9.0 Structural Design Requirements
10.0 Dynamic Performance
11.0 Crashworthiness

Appendices

A. Approval Process
B. Basic Process and Instrumentation Diagram
C. Locomotive End Plate Diagram
D. Tender End Plate Diagram
E. Fueling Interface Diagram
F. Fueling Control Cable Details (FC-16)
G. Drain & Purge Procedures (Tank and Hose Assemblies)
H. Wiring
I. Stenciling
J. Qualification and Maintenance
K. Documentation
L. Back Office Requirements
1.4 APPROVAL

1.4.1 Locomotive Committee

The AAR Locomotive Committee has overall authority for this Specification. Additionally, the Locomotive Committee has specific authority for all aspects in Chapter 6 – TENDER CONTROL UNIT, Chapter 7 - LOCOMOTIVE INTERFACE, and Chapter 11 - CRASHWORTHINESS.

Proponents desiring alternative designs to this Specification shall appeal to the Locomotive Committee.

1.4.2 Tank Car Committee

The Tank Car Committee has specific authority over all aspects of the requirements in Chapter 2 – LNG FUEL TANK REQUIREMENTS, Chapter 5 – PIPING & SERVICE EQUIPMENT, and Chapter 8 – FUELING STATION INTERFACE.

AAR Executive Director for Tank Car Safety will review and recommend to the Locomotive Committee, if appropriate, the proponent’s designs meeting Chapters 2, 5 & 8.

1.4.3 Equipment Engineering Committee

The AAR Equipment Engineering Committee has specific authority over all aspects of the underframe structure, supporting car body and running gear, the requirements which are outlined in Chapter 9 - STRUCTURAL DESIGN REQUIREMENTS and Chapter 10 - DYNAMIC PERFORMANCE.

The EEC will review and recommend to the Locomotive Committee, if appropriate, the proponent’s designs meeting Chapters 9 & 10.
### 1.6 Abbreviations and Definitions

<table>
<thead>
<tr>
<th>TERM</th>
<th>DEFINITION</th>
</tr>
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<tbody>
<tr>
<td>Adapter, Dry Quick Disconnect</td>
<td>Male portion of a dry disconnect fitting.</td>
</tr>
<tr>
<td>AOV</td>
<td>Air Operated Valve (normally closed and opened by air pressure) is used for tender system controls downstream of any FCV.</td>
</tr>
<tr>
<td>Approved</td>
<td>As used in this Specification, “approved” means approval by the respective committees listed in paragraph 1.4.</td>
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<tr>
<td>Cabinet</td>
<td>An enclosed weather-tight housing not subject to crashworthiness requirements.</td>
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<tr>
<td>Closures</td>
<td>A device that closes an opening into the tank valve or fitting. Examples include but are not limited to pipe plugs, quick-disconnect caps, blind flanges, manway covers, outlet cap covers, and pipe caps</td>
</tr>
<tr>
<td>CNG</td>
<td>Compressed Natural Gas. Natural gas under pressures typically in excess of 3,000 psig.</td>
</tr>
<tr>
<td>Coupler, Dry Quick Disconnect</td>
<td>Female portion of a dry disconnect fitting that is attached to a hose.</td>
</tr>
<tr>
<td>Crashworthiness</td>
<td>Accident load cases that the tender must be capable of surviving.</td>
</tr>
<tr>
<td>Design Maximum Fuel Level</td>
<td>The maximum fuel level specified by fuel tank manufacturer.</td>
</tr>
<tr>
<td>Dry Breakaway Fitting, Emergency</td>
<td>A fitting designed to “break” or “pull apart” into separate parts automatically when a specified load is applied and with a de minimis amount of material released.</td>
</tr>
<tr>
<td>Dry Quick Disconnect Fitting</td>
<td>A fitting consisting of two parts, an adapter and a coupler, that allows flow when the two parts are joined and allows a de minimis amount of material to be released when the parts are manually disengaged.</td>
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<tr>
<td>Dual Fuel Locomotive</td>
<td>A locomotive designed to operate on both diesel and GNG at various...</td>
</tr>
</tbody>
</table>
AAR Passenger Standards Group

David L. Cackovic
Develop an AAR Standard approach to address areas of concern including:

- insuring operational safety,
- reducing risks, and
- improving operational efficiency

regarding the introduction and operation of new-design passenger equipment (both passenger cars and passenger locomotives) on freight railroad track, particularly at typical freight railroad speeds (including low speeds).
A new standard(s) would be beneficial for:

- Safety (derailment prevention)
- New equipment waybill moves on revenue freight trains
- New equipment operated by psgr. operators on freight lines
- Mitigating network delays and interference with freight ops
- Growth in passenger operations on Class I Railroads
Identify and prioritize issues for operating passenger equipment on North American freight railroads (up to 110 mph, but must include very low speeds below 15 mph) by:

- AAR Committee Meeting Approach
  - Class 1 Railroads
  - New Passenger Standards Technical Committee
  - Amtrak
  - APTA and Commuter RRs
  - FRA
  - AAR
- Verbal input from meeting discussions, brainstorming, consensus
- Background Research
  - Database searches on derailment causes (NTSB, FRA)
  - Current AAR Standards
  - Literature search of Government Agency Reports (US and Canada)
The TAG met in June, and created six subtasks.

- The relatively simple tasks are almost drafts – i.e. one pagers for the standard for:
  - Existing FRA, PRIIA and APTA standards
  - Access of Track Geometry Data
  - Roles in Corridor Testing on Class I Railroads

- The difficult three tasks are below, and there is a lot of work to do:
  - Vehicle/Track Interaction – Slow Speed Testing Analysis
  - Loss of Shunt Performance Test Requirements
  - Interoperability Requirements
Vehicle/Track Interaction – Testing and Analysis

- Identify testing and/or simulations required to demonstrate safe performance on FRA track classes 1 – 5 (up to 90 mph)
  ▲ Any vehicle in passenger service excluding locomotives
  ▲ Identify limiting VTI performance envelope
    – allow unrestricted movement on Freight RRs
    – identify track and/or operating conditions that limit performance and could restrict movements
- Operation on Track Classes 6 and up covered by FRA 213 Subpart G Track Standards (90 mph and faster)
- Reference existing passenger standards where ever possible
  ▲ Avoid duplication and rework
  ▲ Minimize burden on vehicle suppliers, vehicle owners and operators
  ▲ APTA, FRA, FTA, and others (see also Slide 6)
Review of existing standards

- FRA Vehicle/Track System Qualification requirements (previous slide) including Minimally Compliant Analytical Track (MCAT)
  - 49 CFR Part 213.57(d) & 213.329(d) (lean test)
  - APTA SS-M-014-06 (wheel load equalization)
- FRA low speed derailment advisory (Class 1 track issues)
- APTA Standards: enforcement is currently only by reference from other standards, car design/procurement specifications, etc.
  - Mostly address performance below 20 mph (Class 1 track)
  - APTA SS-M-014-06 (wheel load equalization)
  - APTA PR-M-RP-009-98 (New Truck Design)
  - APTA SS-M-015-06 and SS-M-017-016 (wheel flange angle and tread taper)
  - Curving Safety Performance (under development by APTA PRESS)
- There may be gaps in existing standards for operation at speeds 20 – 90 mph (FRA Track Classes 2 – 5)
  - AAR Ch 11, M-976, S-2043 standards: what could be adapted to fill gaps?
  - Review derailment history to identify problem areas
Review of Derailment Databases

- Identify significant problem areas
- TTCI reviewing NTSB and FRA data bases back to early 1980s
  - Identify derailments attributable to VTI issues
  - Review derailment reports
  - Databases likely to exclude some derailments
    - Below injury, damage and/or cost thresholds for required reporting
- APTA (Martin Schroeder) to ask members for input

Use derailment information to help identify required tests and/or simulations

- Standard should also address other common/likely operational conditions
Next steps

- Continue review of derailment data bases
  ▲ Use information to help identify required tests and/or simulations for new AAR standard
- TTCI participation in APTA PRESS Curving Safety Performance Development
  ▲ AAR passenger standard likely to reference it
- TTCI participation in FRA RSAC VTI meeting 11/20/15
- Begin drafting VTI test and/or simulation analysis requirements for Class 1-5 tracks up to 90 mph
  ▲ Reference other standards where possible
  ▲ Take information from past derailment history but also include other common/likely operational conditions
Ch. 11 Criteria are similar to 49CFR Part 213.333

S-2043 Criteria are more conservative than CH. 11

<table>
<thead>
<tr>
<th>Regime</th>
<th>Paragraph</th>
<th>Criterion</th>
<th>Limiting Value</th>
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<tr>
<td>Hunting (empty)</td>
<td>11.7.2</td>
<td>maximum lateral acceleration (g)</td>
<td>1.5&lt;sup&gt;a&lt;/sup&gt;</td>
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<td>maximum wheel L/V</td>
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<td>maximum axle sum L/V</td>
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<td>minimum vertical load (%)</td>
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<td>dynamic augment acceleration (G)</td>
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<td>loaded spring capacity maximum (%)</td>
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<td>Pitch, bounce (loaded)</td>
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<td>(empty at EEC discretion)</td>
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THANK YOU