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Exporail

March 26-27, 2019



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AAR Equipment Engineering
Committee (EEC) Senior Manager



Exporail 2019 Presentation

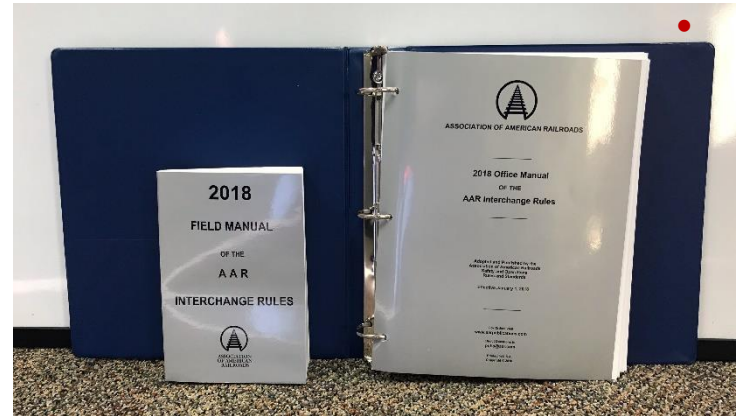
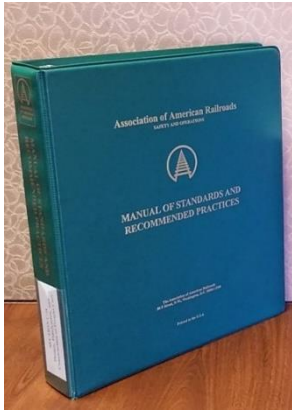
- Equipment Engineering Committee
- Interchange Rules and How They are Maintained
- Rule 66 Update – Reflective Sheeting
- Rule 59 Update – Cushioned Underframe Devices
- EEC – Interchange Rule Task Force
- EEC Task Force - Marking of Freight Cars

Equipment Engineering Committee (EEC)

- Develops and maintains design standards and operation rules for freight cars and their components
- Serves as the oversight committee for the AAR's BSC, WABL, CSTCC, and SEFCC; and provided direction for the IC relative to car construction
- Responsible for technical certification (approval) of:
 - New freight car designs (M-1001) including tank car stub sills
 - Freight car builders (S-2034)
 - Components: Trucks, draft gears, cushion units, outlet gates, trough covers, boxcar doors, running boards, and flooring
 - Office Manual Rule 88 Compliance (New Cars, Rebuilds, Increased Life, Increased Gross Rail Load)

Equipment Engineering Committee

- EEC Publication Responsibilities



- **Manual of Standards and Recommended Practices**

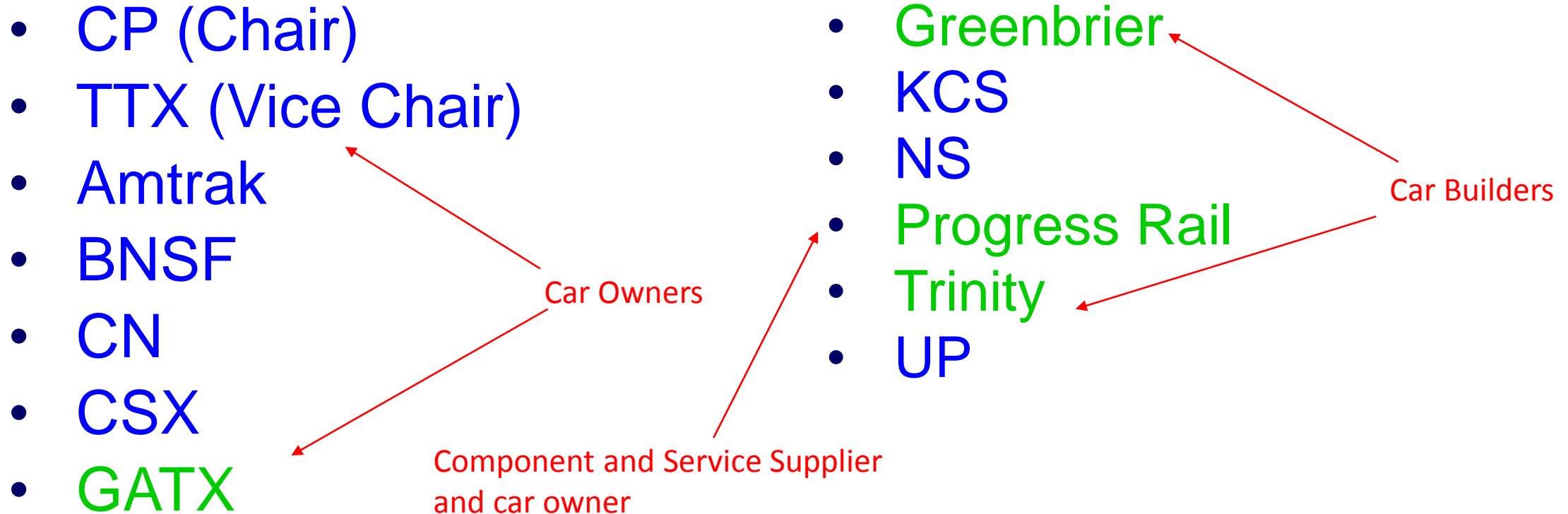
- Section B Couplers and Freight Car Draft Components
- Section C M-1001 Car Construction Fundamentals and Details
- Section C Part II Design, Fabrication, and Construction of Freight Cars
- Section D Trucks and Truck Details
- Section L Lettering and Marking of Cars

Field and Office Manual

- RULE 21 Draft Gears, Carriers and Followers
- RULE 46 Truck System Performance
- RULE 50 Truck Springs
- RULE 53 Running Boards
- RULE 57 Center Sills
- RULE 58 Side Sills
- RULE 59 Cushioned Underframe Devices
- RULE 60 Body Center Plates
- RULE 61 Body Side Bearings
- RULE 62 Truck Side Bearings
- RULE 66 Reflective Sheeting
- RULE 73 Trough Hatch Covers
- RULE 77 Door and Door Parts
- RULE 80 Painting and Stenciling
- RULE 88 Mechanical Requirements for Acceptance

Equipment Engineering Committee

- **Members** and **Associate Members** of EEC



Example: Why EEC Approves Car Designs



EEC Approval Freight Car Designs M-1001

Design and Construction of Freight Cars

- **General Data** - Weight limits, dimensional limits, curve negotiation, and limits on bridge loading.
- **Design Loads** - Dead load, live load (loading diagrams), buff and draft loads, impact loads, vertical loads on coupler, jacking loads, plus many more.
- **Fatigue Design** - Car body fatigue life can be predicted based on based on REPOS (Road Environment Percent Occurrence Spectra) input for various car types.
- **Service-worthiness** - Tests for structural, static, impact, and dynamic
- **Hundreds of Component Specifications**

Example: Why EEC Approves Car Modifications



EEC – Supports TSWC on EW/MA

Early Warning/Maintenance Advisory

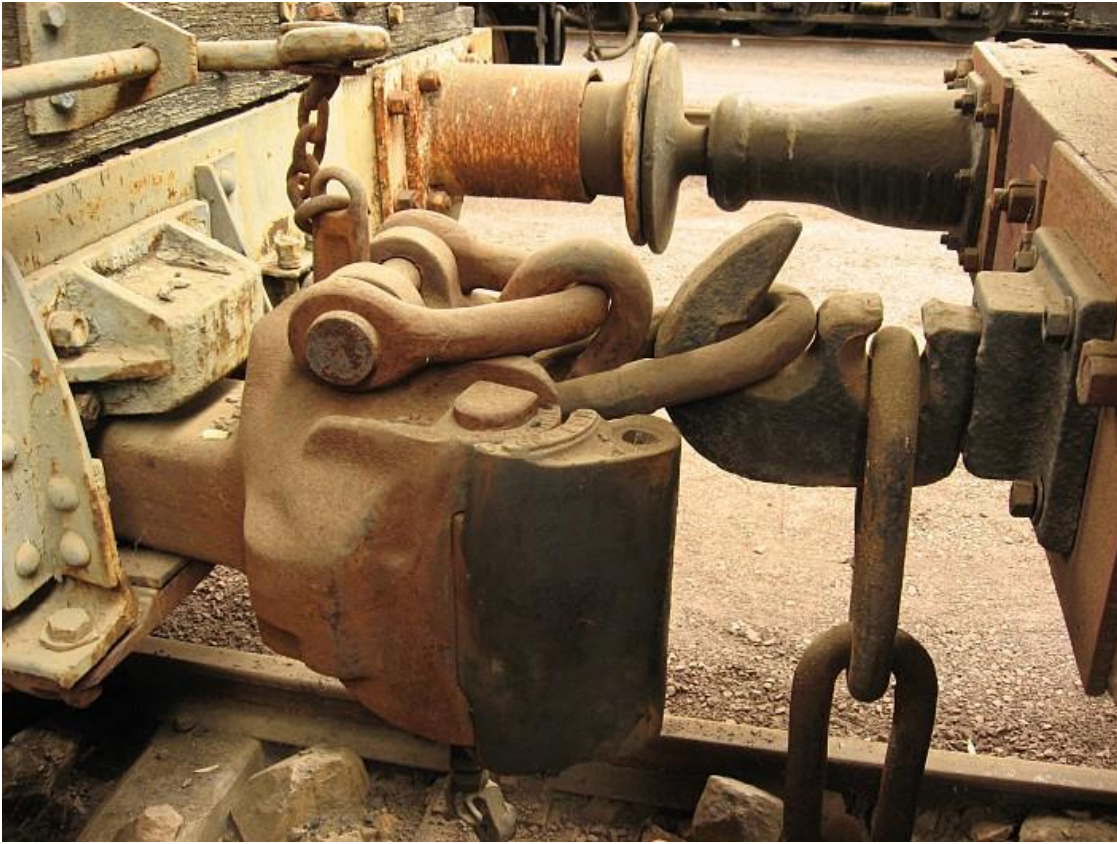
- Railroad or car owner becomes aware of a safety condition involving a group of cars and Notifies AAR
 - Early Warning Notices
 - Safety conditions that might lead to injury or damage
 - Remove car from service for repair as soon as available.
 - Examples: Broken Sills, Autorack Door Hinge Failure, Trainline Arrangement
 - Maintenance Advisory
 - Longer term concern for damage
 - Cars removed from service for repair when convenient
 - Examples: Side angles on tank cars. Cars with over date castings.
 - Maintenance Advisories eventually become Early Warnings
 - If possible, handled by private action of the car owner, or by circular letter.

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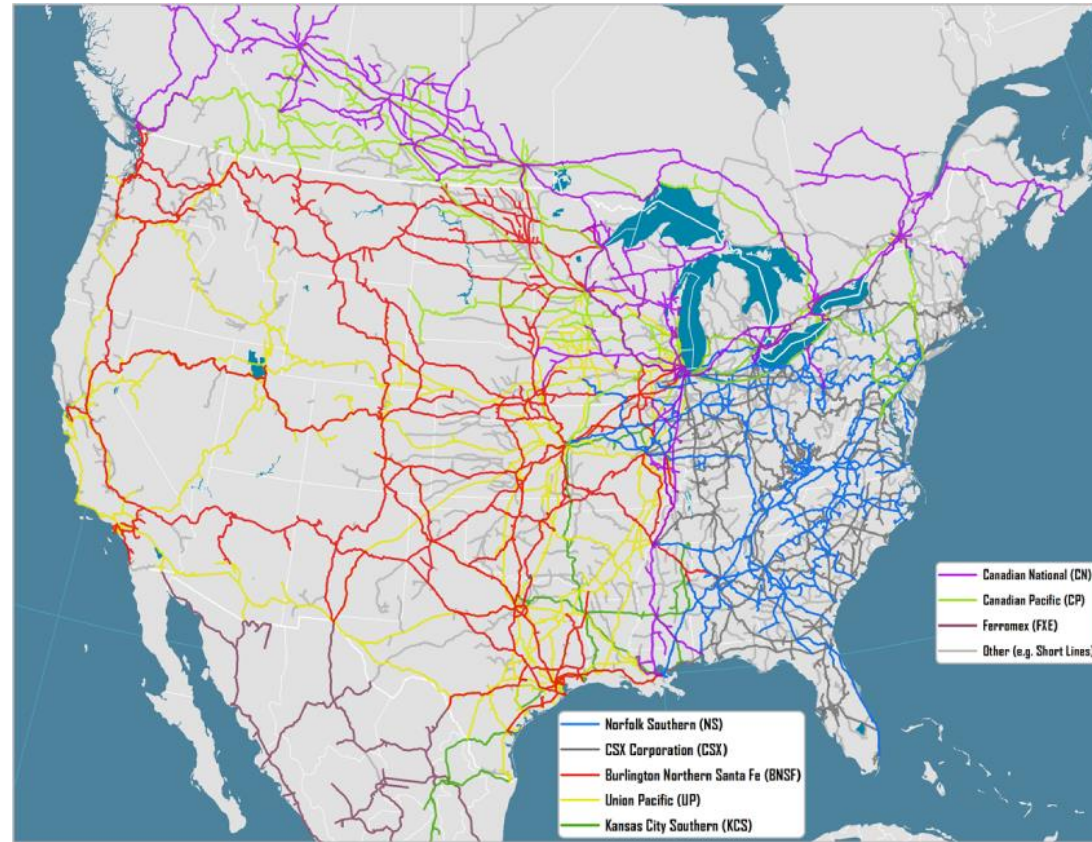
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Why we need Interchange Rules



Why we need Interchange Rules



Why we need Interchange Rules

Interchange Rules

- Interchange: The transfer or delivery of a freight car from one subscriber to another as indicated in the AAR TRAIN II® System.
- Field Manual Rule A:
 - All freight railroads, interchange freight car owners, and running repair agents must subscribe to the AAR Interchange Rules and be listed in FindUs.Rail.
 - Freight Railroads
 - Freight Car Owners
 - Running Repair Agents

Interchange Rules

- Field Manual Rule A:
 - Interchange Rules apply only to subscribers and are formulated in two manuals:
 - AAR Field Manual
 - AAR Office Manual
 - These manuals are guides to the fair and proper handling of interchange of freight traffic.
 - For complete information on a particular subject it may be necessary to consult both Field and Office Manuals as well as other publications referenced in these Rules.

Interchange Rules

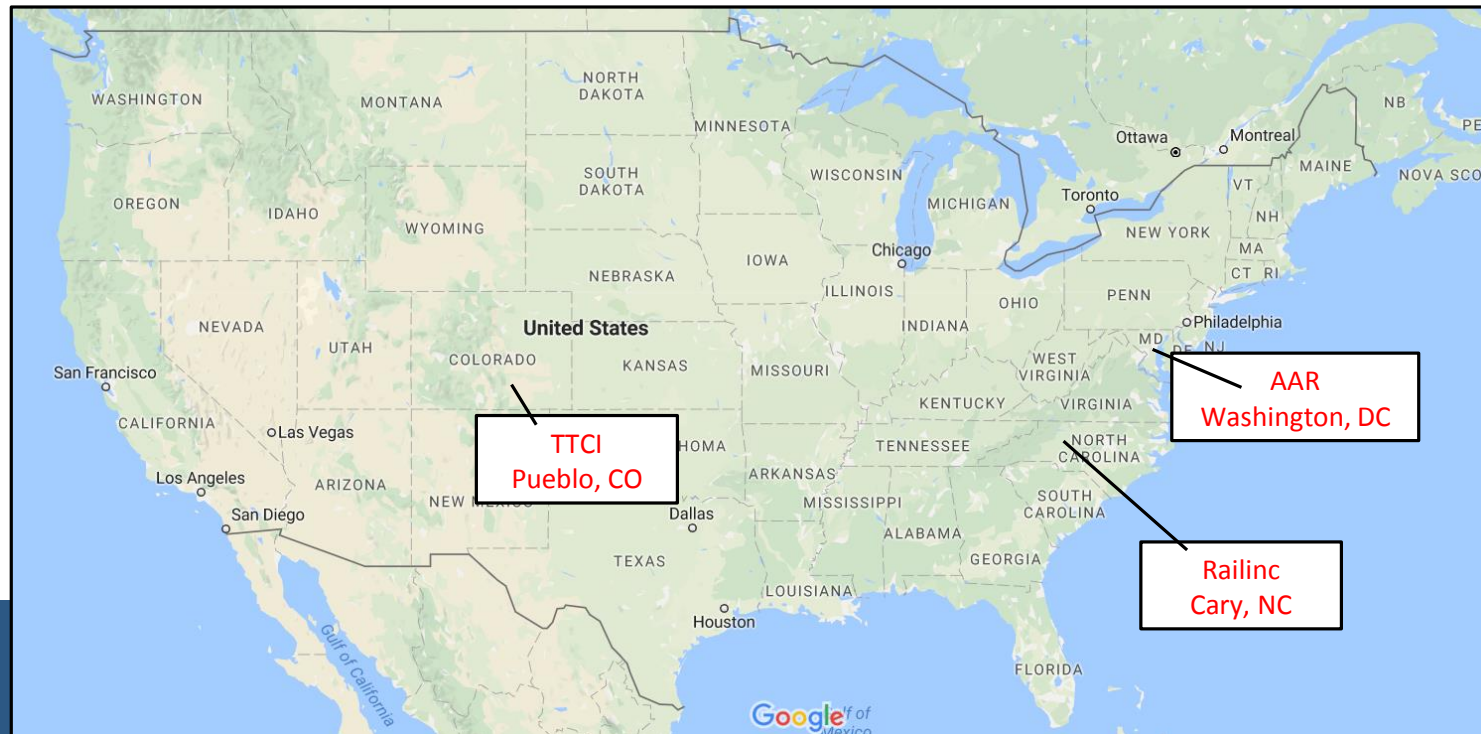
- Rule A - Intent of Interchange Rules (1):
 - Make car owners responsible and chargeable for the repairs to their cars necessitated by ordinary wear and tear in fair service, safety requirements and by the Standards of the Association of American Railroads.
 - Place responsibility with and provide a means of settlement for damage to any car, occurring through unfair usage or improper protection by the handling company.
 - Provide an equitable basis for charging repairs and damages.

Interchange Rules

- Rule A - Intent of Interchange Rules (2):
 - Provide for acceptance or rejection of these rules as a whole, with no exception to an individual rule or rules being valid.
 - Establish that rules contained are not intended to cover nor to interfere with other independent agreements entered into by subscribers.
 - Rules and amendments shall not apply retroactively.

Interchange Rules

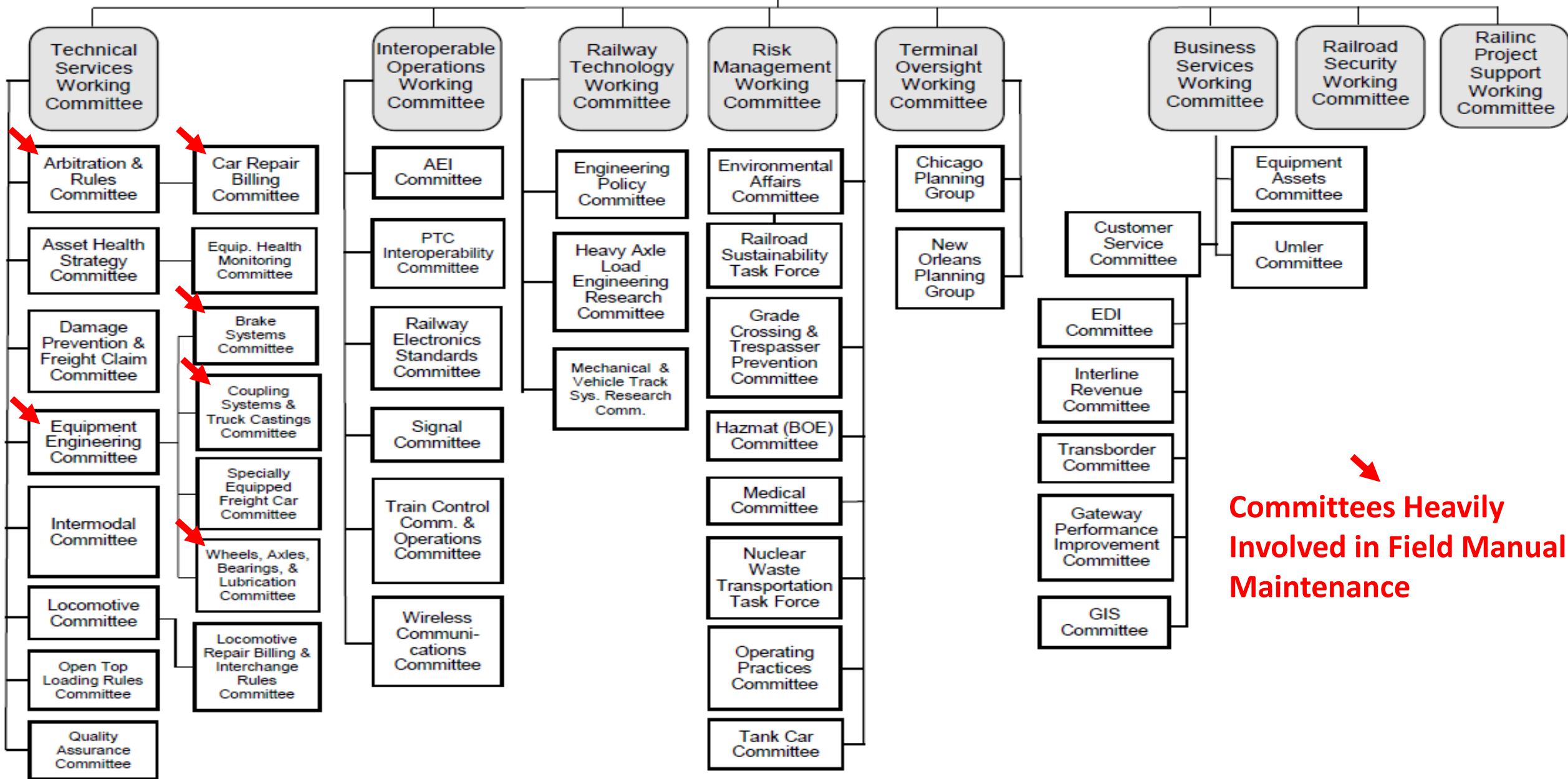
- **AAR Family forms service body for self regulation:**
 - AAR – Association of American Railroads
 - Publish and Police Rules and Standards
 - TTCI – Transportation Technology Center, Inc.
 - Technical Standards Group and MID Group – Support AAR
 - Railinc -Business Systems



Interchange Rules

- Railinc - Handles business transactions and provides other information systems, including (amongst many others):
 - AAR TRAIN II® System – Record of interchange
 - Car Repair Billing – Records of car repair and system of pricing
 - Umler – Freight Car Registry with various car characteristics
 - FindUs.Rail – Database of subscribers
 - Equipment Health Management
 - Early Warning System – To track and repair defective cars

SAFETY & OPERATIONS MANAGEMENT COMMITTEE



Interchange Rules

- The AAR Technical Committees
 - Each is managed by a paid AAR employee.
 - Members volunteer from AAR member companies:
 - Railroads
 - Full Members
 - Affiliate Members (usually regional or short lines)
 - Associate Members
 - Private Car Owners
 - Equipment Suppliers
 - Committees develop standards for equipment and rules for interchange and allowable repairs of freight cars.
 - Requests for changes can come from any subscriber.

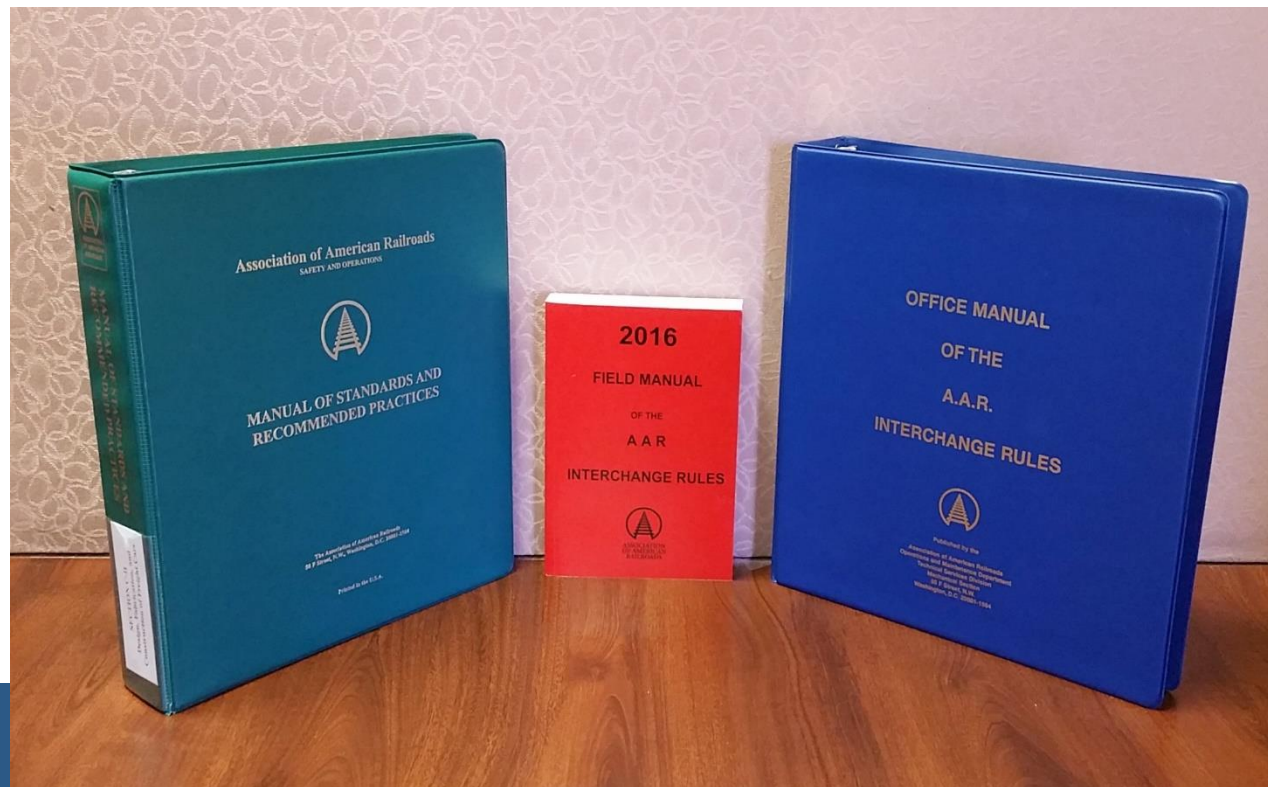
Interchange Rules

- Main Publications for Interchange
 - Field Manual of the AAR Interchange Rules
 - Office Manual of the AAR Interchange Rules
 - AAR Manual of Standards and Recommended Practices



Interchange Rules

- Manual of Standards and Recommended Practices
 - Multiple references from Rules to “MSRP”
 - MSRP sets forth requirements for new cars and new/reconditioned/secondhand components
- “Rule 88” in office manual lists requirements for new cars, linced Gross Rail Load, Modifications, Rebuild, and Increased Life Status



Interchange Rules

Policing functions of the AAR

- Mechanical Inspection Department – Enforce all Rules and Standards
 - All Car Repair Facilities
 - Air Brake Shops
 - Wheel Shops
 - Component Reconditioners
 - Test Observations
 - Support QA Function
 - Other...
- Technical Audits – Contractors reporting directly to Committees
- QA Program

Interchange Rules

- Federal Regulations
 - FRA – Federal Railroad Administration, Department of Transportation, Title 49 Transportation, Volume 4, Chapter II, Parts 200-299 (Publish and Police)
 - Ex. 1: Part 215 Railroad Freight Car Safety Standards
 - Ex 2: Part 231 Railroad Safety Appliance Standards
 - PHMSA - Pipeline And Hazardous Materials Safety Administration, Department Of Transportation, Title 49 Transportation, Volume 3, Chapter 1, Parts 178-199
 - Specifications For Tank Cars



Interchange Rules

- Parties involved from interchange business perspective:
 - Freight Railroads (Class I and Short Lines)
 - Running Repair Agents (listed in Appendix H of the Office Manual)
 - Freight Car Owners
 - AAR
 - Railinc
 - Shippers

Interchange Rules

- Freight cars owners can be:
 - The Railroad who is operating the train
 - A Private Car Owner who asks the railroad to haul the car from an origination point to a destination point (often investment banks)
 - A third party that rents his car on a day-by-day usage basis for anyone to use
- Freight Cars must meet AAR standards to be interchanged, and repairs must be made to interchange standards

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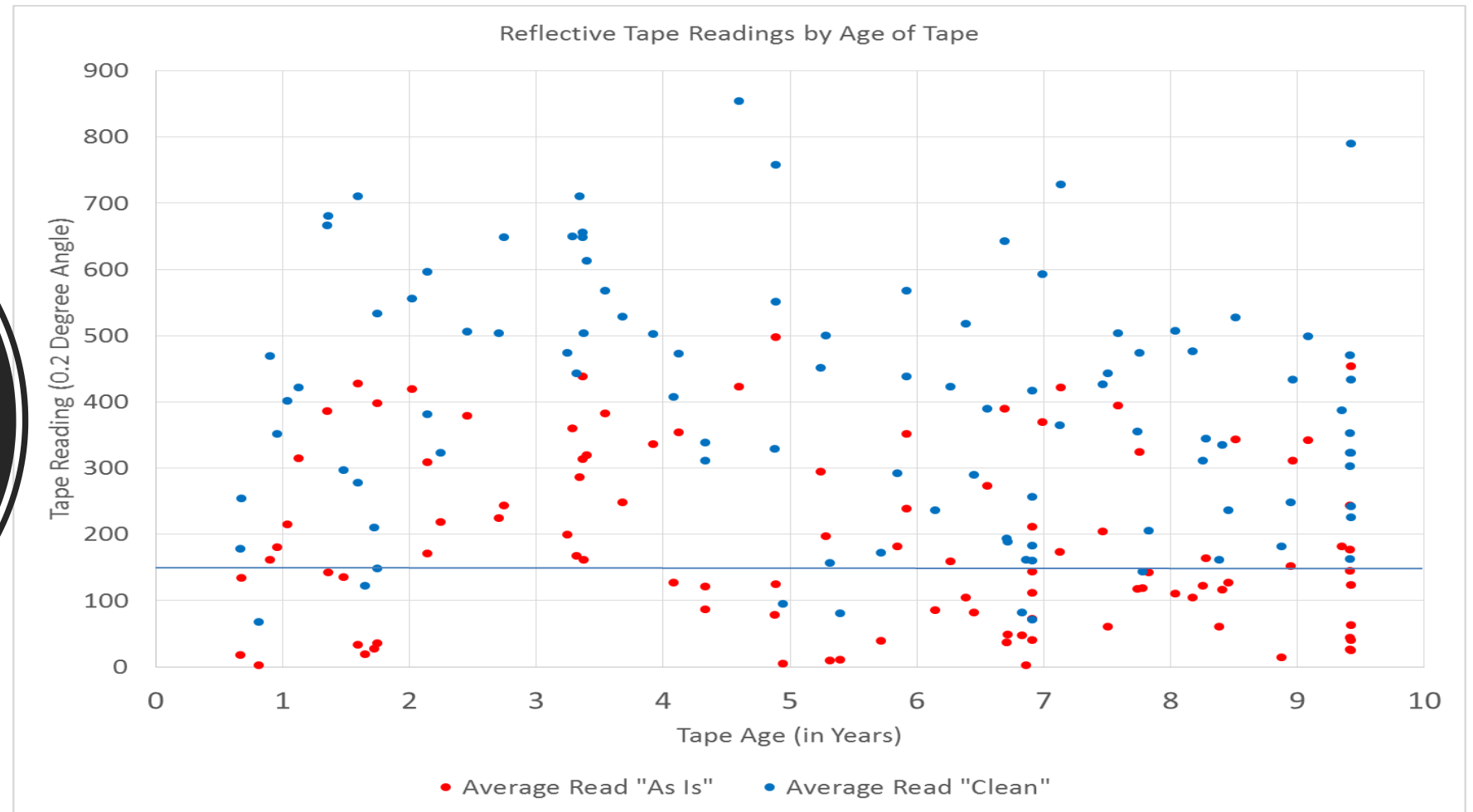
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Rule 66 - Reflective Sheeting Update

- FRA implemented in 2005
- Improves visibility at level crossings
- Goal to reduce accidents/injuries/deaths
- 10 years was given to equip all cars
- 10 years was given for the life of the sheeting installations
- Substantial investment by car owners
- AAR is under a waiver from the 10 year replacement, based on sheeting performance in Rule 66



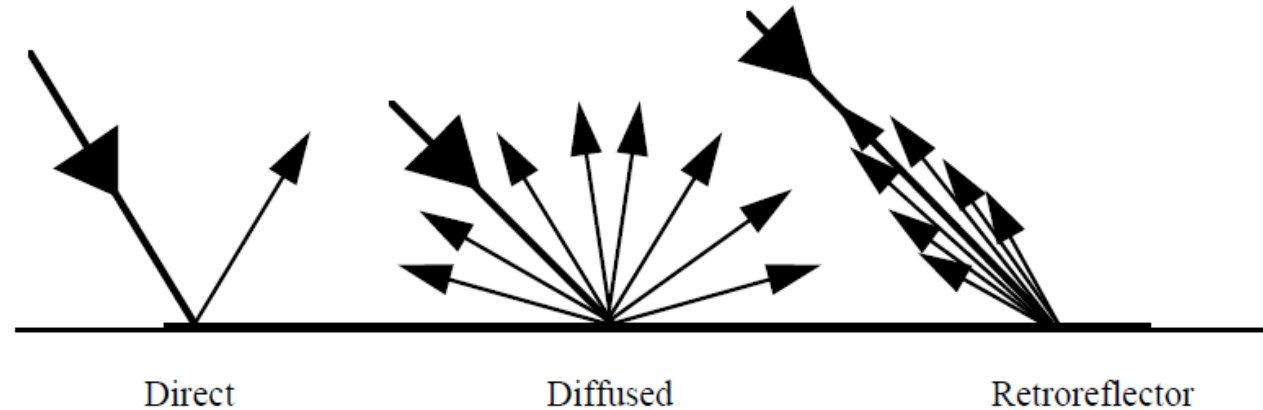
Reflectorization – AAR Study



- 2014 – Study on reflective condition of applied material as Deadline for replacement approached

Rule 66 - Reflective Sheeting Update

- Definition: Retroreflection
 - The phenomenon of light rays striking a surface and being redirected back to the source of light



Rule 66 - Reflective Sheeting Update

- Approved Material – Has FRA-224 Stamp

Standard 4" x 18"
Sheet






Closeup



Revised Rule 66 – Reflective Sheeting New Rules

RULE 66 – REFLECTIVE SHEETING

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

- 
- 
- 
1. At any time
 - a. Cars without any FRA 224 stamped reflective sheeting.
 2. Condemnable when car is on shop or repair track for any reason
 - a. A single side has all (100%) required single yellow FRA-224 stamped sheets completely obscured or missing.
 3. At time of Single Car Air Brake Test (SCABT)
 - a. Any required single yellow FRA-224 stamped sheet that does not meet the minimum retroreflectivity value per Rule 66.E.10. This rule is effective upon issue. Compliance is required by July 1, 2019.
 - b. Any required single yellow FRA-224 stamped sheet with 20% (approximately the size of a 4 inch by 4 inch comparator panel) or more of the sheet obscured, missing, or damaged such that the retroreflective properties are nonexistent. Note: A comparator panel represents approximately 20% of a 4 inch by 18 inch sheet.
 - c. Improperly located or oriented yellow FRA-224 stamped sheeting.
 - d. Cars with white reflective sheeting. See E.1.

Comparator Panels

- Panels must meet the requirements of Standard S-916 “Retroreflective Comparator Panel Requirements”
- Panels must be approved by the EEC
- Rules and Standard are silent on calibration. Why?
 - We don’t know how long a panel will perform well enough to use, but we’ve had one expert that says beyond 10+ years if left stored in the dark. Day to day use will reduce the life
 - Calibration/Verification recommended on an annual basis to start
 - Panels with signs of degradation must be recalibrated more often

Comparator Panels



Inspection Procedure

1. Ensure that the panel is within the calibration date.
2. Place the panel over the sheeting to be evaluated.
3. Select a distance from the side of the car (15 ft is preferred but not required).
4. Evaluate individual reflective sheets at a position straight out from the car
5. Hold the light source adjacent to the eye to take full advantage of retroreflectivity.
6. Compare the reflected light intensity of the reflector to that of the comparator.
 - If the reflective sheeting's reflected light intensity appears brighter than the panel, the sheeting passes the inspection.
 - If the reflected light intensity difference between the panel and the reflective sheeting cannot be discerned or if the panel appears brighter than the sheeting, the sheeting must be replaced.

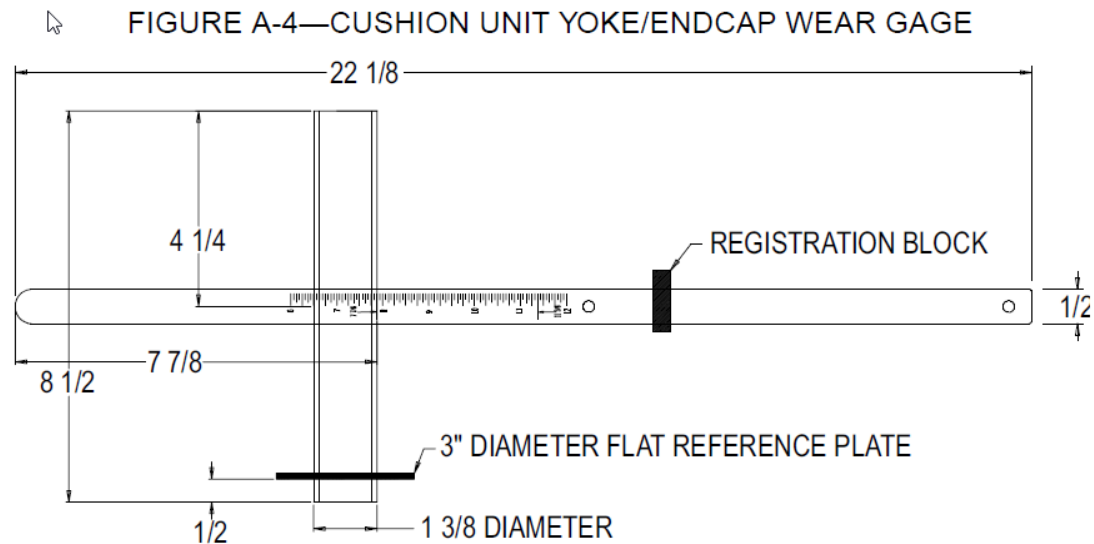
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Rule 59 – Cushioned Underframe Devices

- FRA has granted relief from the regulation that calls for replacement based on “Three Clearly Formed Droplets” based on use of the Unit Condition Indicator (UCI). Expectation was that removals would drop.
- However, as part of the waiver, EEC initially implemented two pages of causes for attention in Rule 59 (all items under A.2 and A.3). Examples:

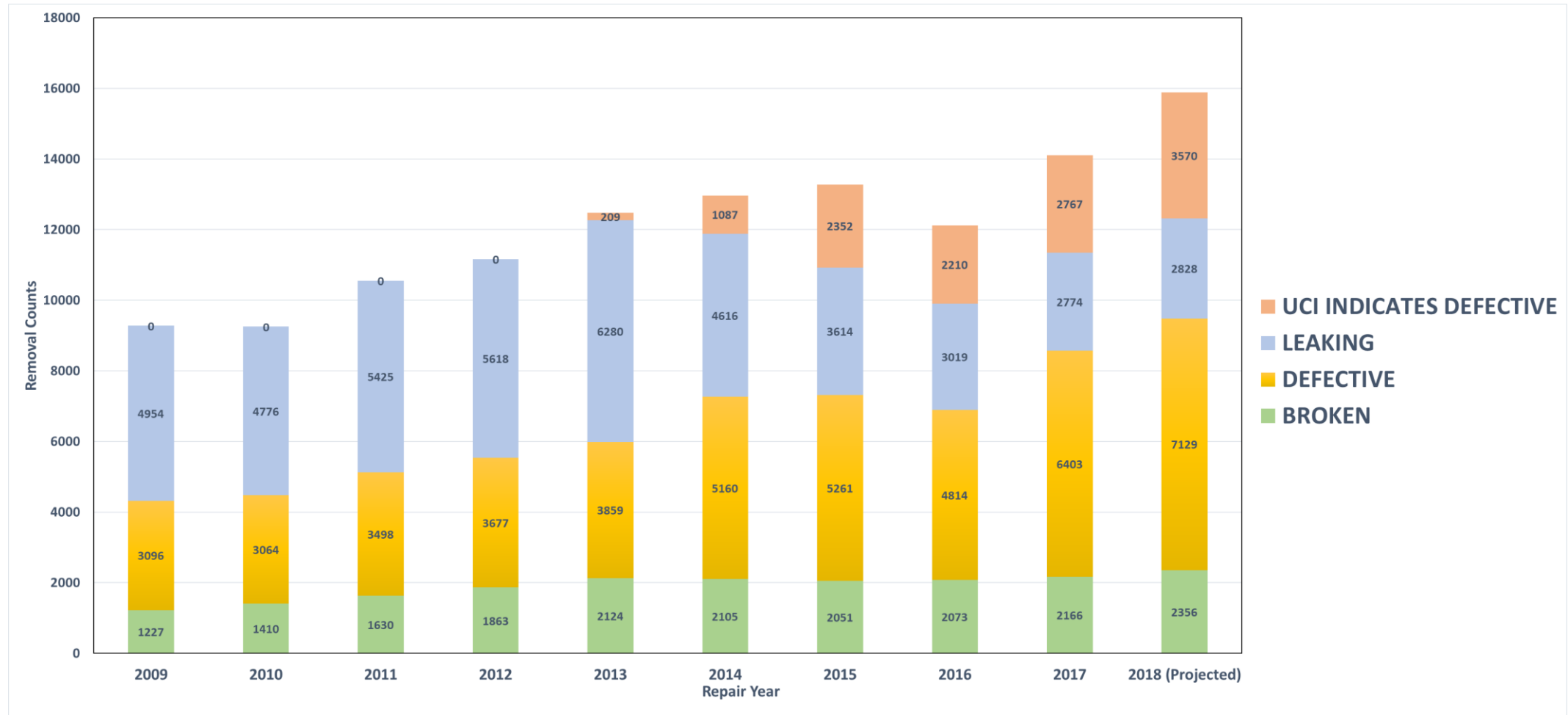
horn/striker contact



Rule 59 – Reasons for Additional Causes for Attention

- In the decades since cushion units were implemented, no specific wear related rules had been implemented
 - Industry likely had an accumulation of worn components (pent up demand for repair)
 - The free slack (on one end of a car) has been measured in service at over 4 inches
- In limited cases, UCI may indicate “good” on a poorly performing unit. Additional guidance was needed to address these units
- Worn yokes and worn pockets had led to binding of the shaft cap (nut), fracture, and then detaching the cushioning device from the yoke
- A substantial number of line of road failures are on cushion unit equipped cars. We are working to reduce this number.

Cushion Unit Repairs for Last 10 Years

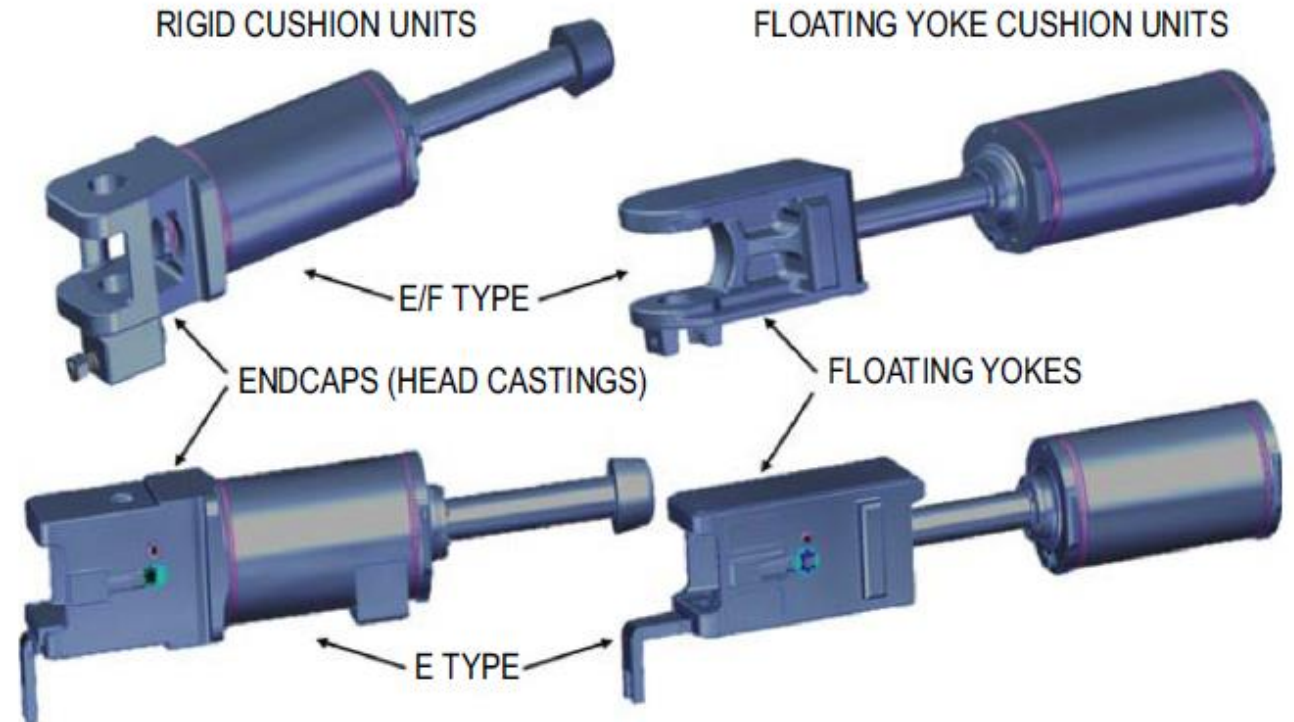


Current Status

- EEC has received requests from M-212 approved coupler and yoke reconditioners for approval to reconditioning cushion unit floating yokes
- There are no AAR guidelines/requirements for reconditioned cushion unit yokes
 - Current manufacturers recondition without full heat treatment, and we have had good success
 - Recent proposal included full heat treatment
- EEC currently considering adding requirements for cushion unit yokes/endcaps and for reconditioning of cushion unit yokes/endcaps

Possible New Requirements

- Technical Specification for new yokes/endcaps
- Reconditioning Specification for yokes/endcaps
- Technical Audits for Foundries
- QA Audits for cushion unit Foundries



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EEC – Interchange Rule Task Force - Background

- RRs are striving to be more competitive
- Examples of recent news that raises concern:
 - Autonomous operations and platooning - series of tractor/trailer rigs (improved aerodynamics)
 - Concern for increased the load in tractor/trailer configuration, longer trailers, and multiple trailers
 - Implementation improves fuel and labor cost structure for highway transportation

EEC – Interchange Rule Task Force - Goals

- Q: What can RR mechanical side do to improve efficiency and make RRs more competitive?
 - A1: Work to keep freight cars in service while at the same time maintaining or lowering risks
 - Risk of derailments
 - Risk of Line of Road failures
 - Risk of Injury
 - A2: Additionally...
 - Do not stop cars for routine maintenance
 - Provide items to be submitted for Regulatory Rule reform
 - Identify items for which wayside detectors can be used to identify repairs (whether for risk concern or for maintenance)

EEC – Interchange Rule Task Force - Approach

- Review applicable sections of the Field Manual of the AAR Interchange Rules
- Rank the risk level for every cause for attention (High – Medium – Low)
 - Relative to Risk for Derailment - Line of road failure – Injury
- Identify related regulations, or note that there are not any related regulations
- Suggest changes to each Rule's oversight committee, e.g. Brake Systems Committee
 - High Risk items will result in cause for attention at any time
 - Medium and Low Risk items will be cause for attention when car is on shop or repair track
 - Organize and Declutter rules as we go
 - Restrict use the word defect. We usually only have causes for attention, not defects

EEC – Interchange Rule Task Force - Approach

- Produce a limited number of changes per semi-annual period
 - Field Manual published January 1 and July 1 annually. We will produce two rounds of changes per year.
- Tackle rules based on their arrangement in the Table of Contents of the Field Manual. This year is shaping up as follows:
 - Spring 2019
 1. Draft System Components
 2. Sills
 3. Center Plates and Body Side Bearings
 - Fall 2019
 1. Truck Components
 2. Truck Side Bearings
- Task Force is not overly excited about taking on Air Brake Equipment

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EEC Task Force - Marking of Freight Cars – Approach

- Goal of the Task Force - Clarify all markings required
 - Standard S-910 Lettering and Marking of Cars
 - Include every new car mark (also to be used when repainting)
 - Car builders should not have to go looking for mark requirements
 - Identify optional markings for car owner for new car construction or repainting
 - Rule 80 – Markings
 - Include only those limited marks that will require mandatory maintenance, either regulatory or AAR mandatory.
 - Rule 88 – Mechanical Requirements for Acceptance
 - Include all marks to be provided by the car owner when offered for interchange
 - Eliminate use of the word stencil where appropriate (most places)

EEC Task Force - Marking of Freight Cars - Approach

- Identify all locations outside of Standard S-910 – Lettering and Marking of Cars - where markings or stencils are required
 - 245 areas of instruction had been identified in other Rules, Standards, and Specifications
- Include all marks needed for new car construction in S-910, and remove from other publications
 - Stencils on components to remain in the respective standards
- Move system stencils to badge plates, e.g. truck system, draft system, etc. Badge plate can be decal. Will add items to existing brake badge plate

EEC Task Force - Marking of Freight Cars - Approach

- Provide a standard electronic font to be posted on TTCI website. First cut is complete, working on some improvements

0123456789

A B C D E F G H I

J K M N O P Q

R S T U V W X Y Z

EEC Task Force - Marking of Freight Cars - Example

- 2018 Rule 80

RULE 80 – MARKINGS

A. Cause For Repairs

1. As required

B. Correct Repairs

1. Reporting marks, car initial, and number, in no less than 9 inch characters on sides of car (7 inch characters are allowed on flat cars) and in 4 inch characters on ends of car. End-of-car marks are not required on flat cars.
2. Apply built mark (BLT MO-YR) at BL and AR corners of car.
3. On cars with 75 feet or greater brake pipe length and when length is not included on badge plate, apply length mark (BPL XXX) on BL and AR corners on sides of car above the built mark.
4. Apply markings on clean, dry surface. Either decals or stencils can be used for repair.

Marking of Freight Cars – Proposed/Withdrawn by EEC

- 2018 Rule 80 Draft
 1. Condemnable at Any Time
 - a. Date built new, date rebuilt, or date of ILS, month and year, missing or illegible. In the case of a tank and underframe built at different times (underframe has been replaced) and do not bear distinctive dates.
 - b. Reporting marks, car numbers, and restricted operation markings placed immediately below or to the right of car number on sides of car, missing or illegible.
 - c. Piston Travel Range Markings for cars equipped with other than 10" or 8 1/2" body-mounted brake cylinders, markings on the sides of the car or badge plate displaying the permissible brake cylinder piston travel range and length at which the piston travel is ineffective, missing or illegible.

Marking of Freight Cars – Proposed/Withdrawn by EEC

- 2018 Rule 80 Draft
 - 2. Condemnable When Car is on Shop or Repair Track for Any Reason
 - a. Lightweight and load limit markings per Rule 70, Section B, missing or illegible. Lightweight markings are not required for multi-level and intermodal cars.
 - b. Reporting marks and car numbers on ends of car for other than flatcars, missing or illegible.
 - c. For cars exceeding a height of 16 feet 10 inches or more above top of rail, excess height markings missing or illegible.
 - d. Brake pipe length mark missing or illegible.



Thank you!

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