Welcome

Administrative issues

- Attendance sheet
- Mobile phones to silent please
- Information folder including presentations
- Questions and discussions
# Agenda

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<td>1200 – 1230</td>
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</table>
Emergency evacuation
Emergency evacuation

Main fire evacuation assembly area
Technical forums – housekeeping

- ASA Technical Forums –
  - collaborative open sessions
  - share knowledge / experience sharing
  - grow the technical capability of Industry and Transport
  - not conferences or training/development events

- Participate and contribute – we need input and feedback

- Consider outcomes and reasoning rather than checklists

- Amenities

- Mobiles off / silent please
TfNSW Operating Model

- Secretary Transport for NSW
  - Agencies
  - CBD Coordinator General
  - Office of the Secretary
  - Sydney Metro Delivery Office
  - Sydney Light Rail Delivery Office
  - Freight, Strategy & Planning
  - Customer Services
  - Infrastructure & Services
  - People & Corporate Services
  - Finance & Investment
ASA – beyond standards to whole of life assurance
Consulting and advising across asset life cycle
Questions?
ASA Industry Engagement - Sharing & Listening

Industry Briefings
- Updates, guidance, thought leadership and awareness
- Two to four per year to 150+

Industry Round Tables
- Discuss and dissect key topics from industry briefings
- Two to four per year to approx. 60+

Industry Seminars
- Large technical audiences
- Detailed and application-specific technical learnings and contemporary subject matter

Technical Forums
- Capture and share knowledge and experience
- 20-30 attendees tailored to the subject matter
ASA website - asa.transport.nsw.gov.au

List of AEOs

All TfNSW Standards

All ASA Communications – presentations and forum material

Frequently searched quick links / hot documents
Looking ahead

• Supporting procurement and delivery
• Assurance across all modes – how?... not why?
• Industry capability and capacity
Many pieces to build….but do they make sense?
The complete picture – a work in progress…
Assuring TfNSW across all modes
Nick Berry  
Manager, Industry Engagement  
02 9422 7356  
[Nicholas.Berry@transport.nsw.gov.au](mailto:Nicholas.Berry@transport.nsw.gov.au)
Interface standards
Minimum operating standards for rolling stock
Jakub Zawada, Principal Engineer Rolling Stock, ASA
Interface standards

T HR RS 00000 ST
T HR RS 00100 ST
T HR RS 00200 ST
T HR RS 00600 ST
T HR RS 00814 ST
T HR RS 00820 – 00890 ST

General update to standards that includes:

• Format and layout to TfNSW / ASA requirements
• Addition of TfNSW / ASA authority as required (in place of RailCorp)
• Update of references to RISSB standards and regulator information
• Generally provide clarity in requirements
Interface standards – RSU 100

T HR RS 00100 ST
RSU 100 - Minimum Operating Standards for Rolling Stock - General Interface Standards

Updates to standard include:
• Clarification in rolling stock outlines – hopper doors (RSU110)
• Addition of cant deficiency (RSU 120)
• Addition of bridges and structures loading requirements (RSU 120)
• Update of the vehicle to vehicle interface including clearly defining freight and passenger requirements (RSU 140)
• Update of the noise emission requirements for electric passenger rolling stock (RSU 150)
Interface standards – RSU 100 (continued)

T HR RS 00100 ST
RSU 100 - Minimum Operating Standards for Rolling Stock - General Interface Standards

Updates to standard include:
• Clarification of train stop braking requirements and signal visibility (RSU 160), including further clarification on braking requirements (TN 036:2015)
• Update to train radio requirements - DTRS (RSU 190)
Interface standards – RSU 200

T HR RS 00200 ST
RSU 200 - Minimum Operating Standards for Rolling Stock - Common Interface Standards

Updates to standard include:
- Clarification on brake equipment for freight and passenger rolling stock (RSU 271)
- Update of twist test, inline with RISSB AS7509, including A, B and C twist tests (RSU 283)
- Clarification of requirements for vehicle to vehicle swing test (RSU 285)
- Additional information added for brake performance tests (RSU 287)
- Clarification of kinematic test requirements (RSU 289)
Interface standards – RSU 600

T HR RS 00600 ST
RSU 600 - Minimum Operating Standards for Rolling Stock – Multiple Unit Train Specific Interface Standards

Updates to standard include:

- Clarification of brake equipment and functionality in various modes (RSU 620) including further clarification with TN 035:2015
- Structural integrity and crashworthiness requirements added (RSU 630)
- Door and platform interface requirements added, marking and codes clarified (RSU 630)
- Brake performance requirements clarified (RSU 641)
Interface standards – RSU 600 (continued)

T HR RS 00600 ST
RSU 600 - Minimum Operating Standards for Rolling Stock – Multiple Unit Train Specific Interface Standards

Updates to standard include:
• Ride performance requirements updated to more appropriate limits and longitudinal ride requirements added (RSU 642)
• High level traction performance requirements added (RSU 643 – TN036:2015)
• Updated data logger requirements as per RISSB AS 7527 (RSU 650)
Interface standards – RSU appendices

T HR RS 00814 ST
T HR RS 00820 - 00890 ST
RSU A - I - Minimum Operating Standards for Rolling Stock – Appendices

Updates to standard include:
• Update of EMU/DMU information pack (RSU Appendix A4)
• New appendix for brake curves and general information regarding braking (RSU Appendix C)
• Clarifying driver safety systems including the functional requirements (RSU Appendix D)
• 1500 V OHW interface aligned to international standards and T HR RS 11119 ST (RSU Appendix E)
Interface standards – in progress

T HR RS 00300 ST
T HR RS 00400 ST
T HR RS 00500 ST
T HR RS 00700 ST

Updates to standard include:

- General update to locomotive, freight, and locomotive hauled passenger, mainly regarding ECP, WDP, and braking requirements (RSU 300, 400, 500)
- Investigating bogie warp stiffness requirements (RSU 400)
- General update to road/rail standards including additions from major investigations and incidents (RSU 700 series)
Road/rail standards – in progress

T HR RS 30020 ST
T HR RS 30030 ST
T HR RS 30040 ST

Road/rail, trolley, trailer, support frame, quadricycle certification, recertification and engineering requirements

Updates to standard include:
• General update to recertification and engineering requirements for road/rail vehicles in line with RSU 700 series (T HR RS 30020/30/40 ST)
Signal Interference testing

Dave Nolan, Principal Engineer Signalling Systems, ASA
Current State

Changes to Appendix C – T HR SC 00006 SP

Signalling compliance testing of rolling stock

“Before any rolling stock is permitted to operate on the network it shall first be tested by an authorised and accredited body to be compliant with the details as listed in this and other standards. A test program shall aim to prove the following…”
Future

T HR SC 00006 SP – Technical Note

• ASA will soon publish a Technical note allowing AEO’s to Test Rolling stock

• To facilitate the transfer of this testing ASA will;
  • Conduct a round table forum in Q1 2016 to establish the process by which testing from 3rd parties is recognised
  • Conduct a number of technical forums on the subject
A standard for freight wagon steering

David Hanson, A/Senior Manager, Rail Noise Program
Angle of attack

- **AoA** = angle between wheel set and rail tangent
- **Warp** = angle between side frame and bolster
- **High AoA**
  - Increased *wheel wear* (50%)
  - Increased *rail wear* (50%)
  - Increased *fuel consumption* (10%)
  - Wheel squeal and flanging *noise*
- **High AoA** is caused by:
  - Poor bogie rotation (centre plate friction)
  - Bogie warp (low warp stiffness)

- **Normal AoA**
  - Leading Wheel Set = Wheelbase / Curve Radius
  - Trailing Wheel Set = zero

![Diagram of Angle of Attack and Bogie Rotation](attachment:image.png)
Bogie steering

- Steering performance
  - Related to bogie design
    NOT maintenance
- High warp stiffness = proper bogie steering
Most bogies steer properly

- Typical Week – only 10% of wheels with abnormal AoA
- Bogies that **always** steer properly
  - One Piece / Two Piece
  - 3-Piece with Cross Bracing
  - 3-Piece with Steering Arms
- Bogies that Frequently Steer Poorly
  - Bogies that rely on wedges for Warp Stiffness
    - Basic 3-Piece
    - 3-Piece with Split Wedges
    - 3-Piece with Wider Wedges

Proper Steering 91%
Poor Steering 9%
The process from here...

- Work through a process to develop a workshop test of bogie warp stiffness
- The test will be easy and inexpensive to perform
- The results will be used to update to T HR RS 00400 ST Minimum Operating Standards for Rolling Stock – Freight Vehicle Specific Interface Requirements
- The process will be evidence based so that the rationale is clear
- We will consult the industry throughout
Rolling stock electrical standards
Roy Laurie, Principal Engineer, Rolling Stock Electrical Systems and Greg Paraan, Senior Engineer Rolling Stock Electrical Systems
Electrical standards

T HR RS 00117 ST – Electric Circuits and Equipment for Passenger Rolling Stock

T HR RS 00126 ST – Electronic Equipment Supplied for Passenger Rolling Stock

T HR RS 00164 ST – Cable for Passenger Rolling Stock

T HR RS 01701 ST – Mounting and Installation of Electrical Equipment

- Following the receipt of industry comments regarding the need to comply with AS/NZS 3000.
- New standards produced replacing FE117, FE126, FE164 and SPP1701 (FE116).
- Qualifying the level of compliance with AS/NZS 3000 required by TfNSW.
- Statement of compliance with AS/NZS 3000 Part 1 (non-prescriptive req.)
- Advising the need for compliance with EN50153 Protective Provisions Relating to Electrical Hazards, EN50343 Rules for Installation of Cables and IEC 60077 Electric Equipment for Rolling Stock
Electric auxiliary power supply and battery system for passenger rolling stock

- Safety requirements i.e. galvanic isolation, earthing and isolation system, GPOs, battery handling, emergency load durations
- Equipment protection requirements i.e. overcurrent circuit breakers, under-voltage, BMS
- Interface requirements i.e. shore supply
- Redundancy requirements i.e. equivalent to existing TfNSW rolling stock, failure of EAPS modules
- Battery systems requirements i.e. mechanical, electrical, battery technology
- Technical Note
Electrical standards – T HR RS 11001 ST

Electric passenger rolling stock onboard main power supply system – 1500 V dc

- Safety requirements i.e. earthing, earth-switch system, isolation
- Equipment protection requirements, i.e. HSCB, surge arrester, 50Hz detectors, excessive resets
- Interface requirements i.e. OHW voltage characteristics, current limits
- Redundancy requirements i.e. traction current return, loss of pantograph, equivalent to existing TfNSW rolling stock
- References interface requirements as defined in;
  - T HR EL 90002 & 90003 ST– Voltage and current ratings
  - T HR RS 11119 ST – Power supply interface
  - T HR RS 00850 ST – RSU supply inter.
Electrical standards – T HR RS 11119 ST

Passenger rolling stock 1500 V dc overhead power supply interface requirements

- Safety requirements
- Equipment protection requirements
- Interface requirements
- Redundancy requirements equivalent to existing TfNSW rolling stock
- Alignment with T HR RS 00850 ST RSU Appendix E – Rolling stock 1500V dc overhead power supply interface requirements
- Adoption of international standards to replace, out of date standard references
Electrical standards – T HR RS 12001 ST

Interior and exterior lighting for passenger rolling stock

- Specifies the minimum internal and external lighting levels required by TfNSW
- Ensures DSAPT compliance
- Aligned with, EN 13272 Railway Applications - Electrical lighting for rolling stock in public transport systems
Electrical standards – T HR RS 13002 ST

Passenger rolling stock surveillance systems

- Specifies the minimum CCTV and surveillance functional requirements expected by TfNSW
- Qualifies rolling stock requirements in relation to, T MU SY 10001 ST - Public Transport Closed Circuit Television (CCTV) Functional Requirements Standard
Electrical standards – Potential future developments

- Diesel fleet related standards, including:
  - Auxiliary power
  - Battery management systems
  - Main power
Passenger rolling stock standards

T MU RS 01000 ST Structural Integrity and Crash Worthiness of Passenger Rolling Stock V 2.0
T MU RS 04001 ST Prohibited and Restricted Materials V1.0

T HR RS 17010 ST Rolling Stock Fire Safety – work in progress
T HR RS 04001 ST Passenger Rolling Stock Access and Egress – work in progress

Rolling Stock Car Body Material Selection standard – new standard
Rolling Stock Signage – new standard
Passenger Rolling Stock Interiors - new standard
Structural Integrity and Crash Worthiness of Passenger Rolling Stock –

T MU RS 01000 ST Version 2.0

• Draws on EN 12663-1, EN 15227 and GM/RT 2100
• This second version clarifies the freight 80 t wagon reference obstacle definition for the collision scenarios between a train and a freight wagon to be used in the place of 80 t wagon definition provided in EN 15227: 2008.
Rolling Stock Fire Safety – T HR RS 17010 ST

- Currently in development
- Comparison of EN45545, BS6853 and AS7529.3
- Peak Heat Release Rate
- Estimated publish date Jan 2016
Prohibited and restricted materials – T MU RS 17002 ST

• Developed to ensure usage of materials over the rolling stock life cycle throughout the entire supply chain minimises the risk of harm to the environment and people. Specifies:
  • The UNIFE Railway Industry Substance List
  • Legislation on materials prohibited or restricted in Australia
  • Current requirements on prohibited and restricted materials
Passenger Rolling Stock Access and Egress – T MU RS 17002 ST

• In development
• Policy based on Waterfall incident
• Comparisons with EN14752, TSI, GM/RT 2473 and AS7522.3 with a view to leveraging one of these
Future standards

• Rolling stock car body material selection
  • Based on T HR RS 00010 TI Rolling Stock Car Body Material Selection position paper
  • Aids in the selection of materials for use in the design/manufacture of rolling stock

• Rolling stock signage
  • Customer experience wayfinding initiative workshop
  • Integrate/standardise signage across the rolling stock assets
  • Integrate current practice including other transport modes
Future standards

Passenger rolling stock interiors – a high level standard to capture in one place

- Customer experience functional requirements associated with ride quality, illumination, comfort, internal noise, infotainment, toilets, signage, emergency, etc.
- Reference to relevant standards
- Integrate current practice considering other transport modes
ASA rolling stock standards
External noise limits for passenger EMU
Harry Snaith, Principal Engineer, Rolling Stock Mechanical Systems

November 2015
External noise limits for passenger EMU

T HR RS 00100 ST Minimum Operating Standards for Rollingstock

RSU 100 series – general requirements for all rollingstock

RSU 150 Environmental Requirements (noise only)

New Section (6.3.2 page 49) for external noise limits for Electric Multiple Unit (EMU) Passenger Trains
External noise limits for passenger EMU

- Comply with noise emission limits for the **whole of asset operational life**
- **ISO 3095:2013** except where specified otherwise
- **Stationary tests** conducted in accordance with (iaw) Section 5 measure: $L_{pAeq}$, $L_{pAFmax}$, tonality, frequency spectrum and impulsiveness
- **Constant speed tests** conducted iaw Section 6, at $V=80$ km/h and $V_{max}$ measure: $L_{pAeq}$, $L_{pAFmax}$, tonality, frequency spectrum and impulsiveness
- **Acceleration tests** conducted iaw Section 7 measure: $L_{pAeq}$, $L_{pAFmax}$, tonality, frequency spectrum and impulsiveness
- **Braking tests**: $L_{pAeq}$, $L_{pAFmax}$, tonality, frequency spectrum and impulsiveness
- **Additional measurements** as necessary to determine **vehicle maximum noise operating condition** and individual items of equipment
## External noise limits for passenger EMU

<table>
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<tr>
<th>Test</th>
<th>Test Condition</th>
<th>Metric</th>
<th>ASA</th>
<th>TSI</th>
<th>Existing Fleet Specs*</th>
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<tr>
<td><strong>Stationary 1</strong></td>
<td>section 5.4.2 'normal operating conditions' with additional quantities</td>
<td>$L_{AF\text{max}}$</td>
<td>65</td>
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<td>-</td>
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<tr>
<td></td>
<td></td>
<td>$L_{Aeq}$</td>
<td>62</td>
<td>65</td>
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<td><strong>Stationary 2</strong></td>
<td>section 5.4.3 configured to give maximum noise operating condition [impulsive noise included]</td>
<td>$L_{AF\text{max}}$</td>
<td>71</td>
<td>85</td>
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<td></td>
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<td>$L_{Aeq}$</td>
<td>65</td>
<td>68</td>
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<td><strong>Stationary 3</strong></td>
<td>section 5.4.3 configured to vehicle presentation (cleaning) mode</td>
<td>$L_{AF\text{max}}$</td>
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<td>-</td>
<td>62</td>
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<tr>
<td></td>
<td></td>
<td>$L_{Aeq}$</td>
<td>59</td>
<td>65</td>
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<tr>
<td><strong>V=80km/h</strong></td>
<td>section 6 (with additional quantities)</td>
<td>$L_{AF\text{max}}$</td>
<td>83</td>
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<td>83 - 85</td>
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<td>$L_{Aeq}$</td>
<td>80</td>
<td>80</td>
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<td><strong>Accelerating</strong></td>
<td>section 7 (with additional quantities)</td>
<td>$L_{AF\text{max}}$</td>
<td>82</td>
<td>80</td>
<td>83 - 85</td>
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<td></td>
<td>$L_{Aeq}$</td>
<td>80</td>
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<td><strong>Braking</strong></td>
<td>section 8 (with additional quantities)</td>
<td>$L_{AF\text{max}}$</td>
<td>82</td>
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<td>83 - 85</td>
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<td></td>
<td>$L_{Aeq}$</td>
<td>80</td>
<td>-</td>
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</table>
External noise limits for passenger EMU

• ISO 3095:2013 except where specified otherwise
• Aligned testing requirements with ISO 3095, including test track and conditions
• Standardised measuring distance at L = 7.5m
• Standardised the rolling stock operating conditions for testing
• Criteria and limits for maximum and time-averaged measurements and maintains existing (Australian/NSW) tonal limits
• Introduces criteria for treating impulsive noise
• additional measurements to determine vehicle maximum noise operating condition and individual items of equipment, including treatment for impulsive noise
• Standardisation for asset procurement, type-testing and easier comparison between rolling stock types eg Euro/Aus/Int/TSI
Environmental conditions for rolling stock – T MU RS 17001 ST

Harry Snaith, Principal Engineer, Rolling Stock Mechanical Systems
Environmental conditions for rolling stock

- Defines environmental conditions that prevail across geographical areas of rail networks on which TfNSW operates rolling stock.
- Section 5 provides information about the environmental conditions that will be encountered in NSW and interstate rail networks.
- Section 7 requires the Purchaser to specify the rollingstock RAMS performance referencing NSW conditions and the Supplier to meet the RAMS performance and maintain safety.
- The environmental conditions defined in Section 5 can be expected to occur on a regular basis – the RS to operate in normal or degraded mode.
- Guidance on temperature rise due to climate change.
- Extreme environmental events, with conditions exceeding those defined in Section 5 are likely to occur on occasions.
- Geographical areas covering Sydney metropolitan, NSW rural & Sydney-Brisbane-Melbourne interstate rail networks.
Environmental conditions for rolling stock

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<tr>
<th>Parameter</th>
<th>Metric</th>
<th>Limits / Range</th>
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<tr>
<td>Altitude</td>
<td>m (amsl)</td>
<td>-32 to + 1102</td>
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<tr>
<td>Temperature</td>
<td>°C</td>
<td>-11 to +50</td>
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<td>Humidity &amp; Condensation</td>
<td>RH</td>
<td>&lt;18% to 98%</td>
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<td>Wind Speed (3s gust)</td>
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<td>Rain</td>
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<td>Hail (diameter)</td>
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<td>Solar Radiation (max irradiance)</td>
<td>W/m2</td>
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<td>Lightning</td>
<td>freq</td>
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<td>Flora &amp; Fauna</td>
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<td>Tables 23 -24</td>
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<td>mm</td>
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<td>S5.15</td>
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<tr>
<td>Cleaning, Washplant &amp; Graffiti</td>
<td>-</td>
<td>S8</td>
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Passenger rolling stock driver safety systems (specification)

T HR RS 20003 SP

Kenelm Wong, Senior Engineer Rolling Stock Mechanical Systems and Harry Snaith, Principal Engineer, Rolling Stock Mechanical Systems

November 2015
Passenger rolling stock driver safety systems

- Passenger Rollingstock Driver Safety Systems (Specification) T HR RS 20003 SP

- Supersedes the legacy Fleet Engineering Specifications (FE) FE 158 Operator Enable System and FE 152 Vigilance System

- Interim document to facilitate new RS procurement while a new Train Safety System Standard is developed

- Specifies the existing SFAIRP solution fitted to recent passenger fleets

- Permits the Supplier to provide new technology or variations / improvements on the existing design solutions - requires a Concession if non-compliant

- Specification represents a move towards functional performance based specifications / standards but is a ‘half-way house’ as it is required to specify the existing design solution which is prescriptive.
Existing solution – driver-centred controls

- Vigilance System
- Operator Enable System
- Driver Safety System
- Trip Gear
Direction for new train safety systems

- Human Centred Controls
- Infrastructure Centred Controls
- Train Safety System
- Train Centred Controls
General feedback and questions