RISSB Product Proposal (and Prioritisation)

Public Transport Victoria – Train and Tram Electrical Power Systems work plan proposal

Primary information	
Type of product being suggested:	Rail Traction Power Harmonization Standards, Guidelines and Code of Practice
Title of product being suggested:	Rail Traction Power
Date of suggestion:	14 February 2019
Reason for suggestion:	Australian Rail industry is fast building more rail infrastructures than ever before and wide variety of approach and solutions is evident resulting in high project cost and the quality of approach and product is adding to risks and failure of the system. Existing standards available address the issues but lack with detailed applications that fits for purpose for Australian applications.
Railway discipline area:	Electrical Power Systems
Objective:	
Highlights priorities, managed the design solutions, collect data, analyse to drive innovation and better design management the is fit for purpose.	
Scope:	
• Develop Energy recovery solution for traction substation • Provide best practice solution regarding Electrolysis mitigation • Guidelines to address Step-Potential voltage solution within rail corridor, train stations and rail-viaducts corridor • Best practice for high-speed-low-speed pantograph interface with overhead, tram crossing change-over inter-locking, section-insulators • Address the overhead ambient temperature limitations • Analysis for overhead auto-tension system to reduce length of overhead wire span • Overhead structures design limitation for future proofing • No-load voltage regulation of rectifier and reducing stress to primary equipment • Benefits of using HMI technology for feeder panel maintenance and operation management • Address and Management of localised fault via VLD especially inside Depot and maintenance facilities • Provide and research for new overhead wiring composition – Tin, Alloy, Copper etc • Comparison and recommendation for Twin vs. Single catenary cantilever, what is more efficient • Best Hybrid battery, capacitors for on-board and way-side storage systems. • Functional requirement to be met by UPS supply for synchronization of essential services loads • Clarity between Protective earthing and Functional earthing discrimination within DC rail corridor • Traction power modelling analysis parameters	

Hazard identification:			
1	Step and touch potential	6	Overhead shared assets especially with tramways assets
2	Electrolysis effects cause by DC stray current	7	Rollingstock kinematic envelop within stations, short tunnel, underbridges
3	Protective and functional earth between DC and AC protection	8	Field raw data vs desk top modelling output misalignment – temperature, load flow analysis, voltage drop etc
4	UPS synchronisation issue between existing and legacy interface functions	9	
5	Temperature limitation / ambient for overhead wiring equipment	10	

Benefits:

Inter-operability and stability of electrical systems
Harmonisation between systems interface
Stability of electrical supply and effective management of risks
Opportunity to develop best practice solution
Address the technological growth within transport rail portfolio
Efficient and reliable transport system

Safety

All safety hazards associated with Electrical Operation of rail systems and interface issue for public safety within the rail corridor.

The proposal shall provide detailed process, guidelines and requirement for the management of safety risk and ensure that the following are satisfied;

- Safety consideration for passengers and staff using the transport network
- Reduce if not eliminate electrical risk
- Implement effective risk controls through holistic asset life cycle analysis and assurance process

Interoperability / harmonisation

The standard will set and guide a consistent industry requirement across the entire rail electrical systems network which will clearly drive standardised approach through design, risk management, construction and operational compatibility between operating systems

Financial

With the effective control of risk, whole of life cycle and systems assurance process, this will hugely reduce the capital and operational expenditures of the State while driving consistent requirements management across the entire rail assets

Environmental

- Reduction of green house effect by reducing energy generation
- Minimal DC stray current injection to earth mass and underground assets
- Minimal infrastructure footprints

Impacts:

- Stakeholder engagements
- Legacy issues of existing equipment
- Will require specialist and subject matter experts
- Comparison of studies and findings that is compatible to application
- Best practice may not be applicable to each different operating environment and operating systems
- The framework will not fit for their purpose

#	Reference / source material	Available from
1	EN 50163 – Supply voltages and traction systems	EN Standards website
2	EN 50388 – Power supply and Rolling Stocks	EN Standards website

3	EN 50199 – Electrical clearance	EN Standards website
4	EN 50329 – Traction Transformer	EN Standards website
5	EN50327 – Electricity and Supply systems	EN Standards website
6	EN 50122 – Railway fixed installation – safety, earthing and return circuit	EN Standards website
7	Transport for New South Wales Standards suite	TfNSW website
8	Energy Safe Victoria	ESV Website
9	AS3000 – Electrical Standards	Australian Standards website
10	Electrified Rail Network – Electrical Power Systems application	Various

Definitions

A ***Guideline*** is a set of informative guidance. It is not normative but informative.

A ***Code of Practice*** is a set of descriptions. It is the "how" one can meet a higher-level requirement (either of a Standard, or a piece of Legislation). It is normative, but by its nature can contain several options about how to achieve compliance with the higher-level requirement. It can also have some informative guidance within it if it is more practical than writing a separate guideline.

A ***Standard*** is a set of requirements only. It is the "what" must be done to be claim compliance to the standard. It is normative. It can also contain optional and/or supplementary requirements, but they still should be worded as requirements.

Interoperability is the ability of a process, system or a product to work with other process, systems or products (aka compatible systems through managed interfaces).

Harmonisation - the act of bringing into agreement so as to work effectively together (aka uniformity of systems).