E17O CONSTRUCTION OF ROLLING STOCK

PURPOSE AND SCOPE

The purpose of this Procedure is to advise Laing O’Rourke personnel involved in the purchase of rolling stock of the need to manage the manufacture of the rolling stock which may be undertaken by Select (Laing O’Rourke in-house plant management division) or by third parties contracted to supply an item of rolling stock for use by Laing O’Rourke.

This Procedure applies to all items of rolling stock to be constructed for use by Laing O’Rourke for the railway operations they will be engaged in throughout Australia.

This procedure is to support the accreditation Laing O’Rourke holds for the construction of rolling stock which is contained on the Notice of Accreditation issued by the Office of the National Rail Safety Regulator (ONRSR).

PROCEDURES

The Select Asset Manager – Rail will have the engineering authority relevant to the design, manufacture procurement and commissioning of rolling stock as required in terms of the Rail Safety National Law and will, with other stakeholders implement the processes in accordance with Laing O’Rourke’s procurement processes.

When a decision is made that an item of rolling stock needs to be constructed the Select Asset Manager – Rail will discuss the requirements with the relevant Operations Manager / Project Leader and on agreement of its structure apply the design management processes contained in E-P-8-1917F Design Management of Rolling Stock.

When the design has been determined it will be necessary for the Select Asset Manager - Rail to source an organisation who will undertake the manufacture and supply of the item of rolling stock.

Prior to manufacture, a detailed technical specification will be formulated and agreed with the supplier and incorporated in any supply contract. The technical specification will include as appropriate:

1. Introduction........................................................................................................................................
1.1. Purpose of the Specification..............................................................................................................
1.2. Background......................................................................................................................................
1.3. Terms and Definitions.......................................................................................................................
1.4. Scope of the Specification................................................................................................................
1.5. Machine Specification.....................................................................................................................
1.6. Applicable Standards .......................................................................................................................
2. Technical Specification

2.1. Hi Rail System - May need to make it generic as in rail system Design/type (On Track Machine Engineering Acceptance)

2.2. Travel and Work Configuration

2.3. On-Track Travel Capability (Speed)

2.4. On and Off Tracking (Approach and Departure Angles)

2.5. On-Track Working Capability (Steering)

2.6. On-Track Stability/Performance

2.7. Electrical Wiring, Wiring Enclosures and Insulation

2.8. Track Signal Circuit Isolation

2.9. Electrical Control Function Indications

2.10. Safety Devices and Interlock Controls

2.11. Hydraulic System

2.12. Emergency Recovery System

2.13. Machine Maintainability


2.15. Locks and Security

2.16. Operator Field of Vision

3. Rail Specific Design Requirements

3.1. Rolling Stock Outline

3.2. Height Restrictions

3.3. Slew Restrictions

3.4. Load/Reach Restrictions

3.5. Body and Underframe

3.6. Protective Structures

3.7. Lights and Warning Lights

3.8. Audible Warning Device

3.9. Speed Indicating Device

3.10. On-Track Braking Capability

3.11. Rail Wheel Design

3.12. Bogie Frame/Suspension Design

3.13. External Markings and Signage
3.14. Instruction Signs, Safety Warnings and Decals .................................................................
3.15. Compliance Plates ............................................................................................................
3.16. Rail Registration ..............................................................................................................
4. Rail Industry Acceptance Testing .........................................................................................
5. Engineering Certification ......................................................................................................
5.1. Structural Certification ....................................................................................................
5.2. Operational Certification ................................................................................................
6. Documentation ....................................................................................................................
6.1. Operation and Maintenance Manual ................................................................................
6.2. Parts and Schematics Manual ..........................................................................................
6.3. Load Charts from Stability Tests ....................................................................................
6.4. Plant Hazard Assessment .................................................................................................
6.5. Operator’s Visibility Diagram .........................................................................................
6.6. Operator’s Noise Exposure ............................................................................................... 
6.7. Main Frame Design, Stress and Life Cycle Calculations
6.8. Axle Bearings
6.9. Wheel design, approved manufacture and assembly certification .................................. 
6.10. Bogie design and approval ..............................................................................................
6.11. Vehicle on - track test results ....................................................................................... 
6.12. Draw Gear and Coupler Design ....................................................................................
6.13. Braking Systems .............................................................................................................
6.15. Welding Standard ...........................................................................................................
6.16. Driving Cab design ........................................................................................................
6.17. Driving & Operational Cab Sound Proofing .................................................................
6.18. Windscreens ...................................................................................................................
6.19. Fire Safety System .........................................................................................................
6.20. Driver Safety System Data Logger ................................................................................
6.21. Audible Warning Devices
7. Acceptance Criteria and Commissioning ............................................................................
7.1. Conceptual Design .......................................................................................................... 
7.2. Finite Element Analysis (FEA) ......................................................................................
7.3. Manufacture (complete to delivery phase) ......................................................................
7.4. Commissioning Process

8. Delivery Schedule

Appendices

Appendix 1: Unit drawings
Appendix 2: Rolling Stock outline drawings
Appendix 3: Vehicle Details
Appendix 4: Electrical Safety Signs
Appendix 5: Rail Registration Label

The Asset Manager - Rail will ensure that construction of the rolling stock or modification of existing rolling stock complies with the approved design configuration and the following standards as appropriate:

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
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<tbody>
<tr>
<td>AS1101.1-1993</td>
<td>Graphic symbols for general engineering - Hydraulic and pneumatic systems</td>
</tr>
<tr>
<td>AS/NZS-1269.1</td>
<td>Occupational Noise Measure and management</td>
</tr>
<tr>
<td>AS1418.8</td>
<td>Cranes, Hoists &amp; Winches</td>
</tr>
<tr>
<td>AS1418.10</td>
<td>Mobile Elevating Work Platforms</td>
</tr>
<tr>
<td>AS1554</td>
<td>Welding of Steel Structures</td>
</tr>
<tr>
<td>AS1906.1</td>
<td>Retroreflective materials and devices for road traffic control purposes -</td>
</tr>
<tr>
<td></td>
<td>Retroreflective materials</td>
</tr>
<tr>
<td>AS1939</td>
<td>Degrees of protection provided by enclosures for electrical equipment (IP</td>
</tr>
<tr>
<td></td>
<td>Code)</td>
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<tr>
<td>AS2019-1986</td>
<td>Fluid power - Hydraulic and pneumatic cylinders - Bore and rod dimensions</td>
</tr>
<tr>
<td>AS 2294.1-1997</td>
<td>Earth-moving machinery - Protective structures - General</td>
</tr>
<tr>
<td>AS2671-2002</td>
<td>Hydraulic fluid power - General requirements for systems (ISO 4413:1998,</td>
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<tr>
<td></td>
<td>MOD)</td>
</tr>
<tr>
<td>AS/NZS 3000:2007</td>
<td>Australian/New Zealand Wiring Rules</td>
</tr>
<tr>
<td>AS3791-1991</td>
<td>Hydraulic hose</td>
</tr>
<tr>
<td>AS4024.1</td>
<td>Safeguarding of machinery – Part 1 – General Principles</td>
</tr>
<tr>
<td>AS4292.1</td>
<td>Railway Safety Management – Part 1 – General Management</td>
</tr>
<tr>
<td>AS4292.3</td>
<td>Railway Safety Management – Part 3 – Rolling Stock</td>
</tr>
<tr>
<td>ISO4413- 1998</td>
<td>Hydraulic fluid power - General rules and safety requirements for systems</td>
</tr>
<tr>
<td></td>
<td>and their components</td>
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<tr>
<td>AS 7501</td>
<td>Certification of Rolling Stock</td>
</tr>
<tr>
<td>AS 7502</td>
<td>Road Rail Vehicles</td>
</tr>
<tr>
<td>AS 7531-4</td>
<td>Lighting and Rolling Stock Visibility – Infrastructure Maintenance Rolling Stock</td>
</tr>
<tr>
<td>AS7500</td>
<td>Other RISSB Standards relevant to specific aspects of the item of rolling stock</td>
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</tbody>
</table>
In addition to complying with the relevant standards identified in the chart above it will also be necessary for the Select Asset Manager - Rail to comply with the specific requirements set by the Rail Infrastructure Manager on whose railway the item of rolling stock will operate. Some examples are included below:

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<tbody>
<tr>
<td>ESR 0001-700</td>
<td>Minimum Operating Standards for Rolling Stock – Infrastructure Maintenance</td>
</tr>
<tr>
<td>ESR0002</td>
<td>Road-Rail Vehicle Certification</td>
</tr>
<tr>
<td>ESR0002</td>
<td>Minimum Rolling Stock Requirements</td>
</tr>
<tr>
<td>EN-ST-098 / 3.0</td>
<td>Infrastructure Maintenance Vehicle Certification and Registration¹</td>
</tr>
<tr>
<td>PP-124.1</td>
<td>Track Maintenance Vehicle Registration and Operation</td>
</tr>
<tr>
<td>RSSB – Railway Group Standards</td>
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<tr>
<td>RIS-1530-PLT Issue 2</td>
<td>Engineering Acceptance of Road Rail Vehicles</td>
</tr>
<tr>
<td>RIS-1700-PLT Issue</td>
<td>Rail Industry Standard for safe use of Plant for Infrastructure Work</td>
</tr>
<tr>
<td>GM/RT2100.Issue 5</td>
<td>Requirements for Rail Vehicle Structures</td>
</tr>
<tr>
<td>GM/RT2400 Issue 6</td>
<td>Engineering Design of On-track Machines in Running Mode</td>
</tr>
<tr>
<td>AAR specification M107</td>
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All variances from the approved configuration that become necessary during the construction phase are to be approved by the Select Asset Manager – Rail as the Independent Competent Person (ICP) approved by the respective network owner on whose railway the item of rolling stock is to operate. As the ICP the Select Asset Manager - Rail will exercise engineering authority for the scope of the change required to be made. All variances from the approved design will be documented at the time the variance is approved, and will become part of the "as-built" documentation.

The Select Asset Manager – Rail will ensure that, prior to the use of new or significantly altered rolling stock, commissioning will be completed appropriate to the intended use, standards and alterations made.

**Procurement of Rolling Stock**

**Commissioning of Rolling Stock**
Registration of Rolling Stock will be in accordance with Element 17J Registration of rolling stock.

**LEGISLATION, GUIDES AND STANDARDS**

Rail Safety National Law
ONRSR Guideline Preparation of a Safety Management System
AS 4292.1 Railway Safety Management – General Requirements
AS 4292.3 Railway Safety Management – Rolling Stock
AS 7501 Certification of Rolling Stock
AS 7502 Road Rail Vehicles.
Additional RISSB Rolling Stock Standards relevant to respective aspects of the rolling stock.