

PART E

TECHNICAL REQUIREMENTS

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E1. INTRODUCTION

E1.1 General Description

The RailCorp XPT fleet consists of cars between 11 and 22 years old and are expected to remain in service for at least a further 10 years. The fleet consists of 60 trailer cars and 19 power cars.

The work forms part of the overall refurbishment of the XPT fleet to return the cars to “as new” condition in terms of presentation, passenger and crew comfort, reliability, and performance. The project will also introduce modifications to achieve improved performance, safety, and compliance with latest standards and regulations.

E1.2 Car Types

The XPT Trailer car fleet is made up of 60 Trailer Cars as listed below. Schematic drawings of each car type are attached in Appendix E1.

<i>Car Type</i>	<i>Qty</i>	<i>Car Numbers</i>	<i>Built</i>	<i>Converted to current configuration</i>
Economy class sitter With luggage	9	XFH2104-2110	1983/84 – Comeng	
		XFH2112-2113	1983/84 – Comeng	1993
First class sitter with Buffet	9	XBR2150-2153	1981/82 – Comeng	1994
		XBR2154-2156	1984 – Comeng	1994
		XBR2157	1986/87 – Comeng	1993
		XBR2158	1983/84 – Comeng	1993
Economy class sitter	25	XF2200-2211	1981/82 – Comeng	1993
		XF2212-2213	1984 – Comeng	1993
		XF2214-2224	1986/87 – Comeng	1993
First class sitter	9	XL2228-2232	1993 – ABB	
		XL2233-2236	1981/82 – Comeng	1993
First class sleeper	8	XAM2175-2182	1993 – ABB	

E1.3 Scheduled Works

Scheduled Works are the works, which are mandatory under the Contract. Scheduled works include all works nominated in Part E unless otherwise stated.

E1.4 Site for Installation

The site for installation will be at either the ‘Main Contractor’s’ site at Chullora or XPT Maintenance Centre at Sydenham.

E2. SCOPE OF WORKS

E2.1 General

The XPT train offers a chilled water fountain in each passenger car. The equipment that provides this has now become unserviceable due to its age and unavailability of spare parts. The Scope of Works is to replace the existing chilled water system with a new system.

The Scope of Works also includes the design, supply and installation of a new filtration system for the water reticulation system for each carriage.

The Scope of Works includes all installation work unless this work is specifically excluded in the Letter of Acceptance.

Coordination of Works

The Contractor shall carry out the Work on the 'Main Contractor's' site. The Main Contractor is the Contractor carrying out the Major Refurbishment of the Trailer Cars for the Purchaser. This Contract relates to some of the items of the refurbishment on the Trailer Cars. Thus the Contractor shall work with the Main Contractor and other sub-contractors. The Contractor shall take directions from the 'Main Contractor's' delivery schedule.

E2.2 Existing Chilled Water System

The existing Chilled Water System is located in specialised lockers. The locations and assembly arrangements vary in each car type. Separate photographs of the existing system on a car type basis are in Appendix E1. Also attached in Appendix E1 are extracts from Comeng Manuals and drawings tabulated in Table EA1.

The pipework schematic from the manual has been marked to identify equipment within the lockers that will be removed subject to finalisation of design by the Contractor. Each chilled water locker contains a drain point.

Isolate and disconnect power, air and water to existing unit. Remove existing chilled water supply unit and all ancillary equipment associated with it. If Contractor decide to utilise all or some of water dispensing equipment this may be left in its current position and reused.

The existing chiller compressor located as shown on ABB drawing 800 032821 shall be removed as it does not meet current and future standards. The Contractor shall remove and dispose of the compressor in accordance with safe and environmentally accepted methods and procedures.

E2.3 Existing Reticulation System

The existing water reticulation system comprises of

- Cold Water Tank located under the carriage (under air pressure of 100 to 125 KPA)
- Inlet pipework and appurtenances (Filling point etc.)
- Outlet pipework and appurtenances (Showers, toilets, handbasins, hot water systems, chilled water units)

E2.4 New Chilled Water System Overall Requirements

The new chilled water system shall meet the following requirements in addition to other specified requirements.

- The system shall deliver a minimum of 85 cups (145 ML/ cup) of chilled water per hour.
- The chilled water shall be between 10° to 15° C.
- The system design shall have a life expectancy of more than 10 years.
- Existing equipment may be reused provided it meets all current requirements
- The equipment shall be powered either from the train variable 3 phase voltage (276 V and 415 V) or by 110 V DC train supply. Controls shall utilise 110 V DC only. It is permissible to utilise inverters or DC/DC converters to achieve desired power requirements.
- The tank shall be constructed of 316 SS with minimum wall thickness of 1.2 mm and shall be mounted to conform to Environmental Operation standards as set out below. Tank shall have a provision to be fully drained and manually filled in addition to automatic filling from the main water reservoir. The filling point shall be made secure and vandal proof. Tank shall be insulated to maintain desired chilled water temperature. Insulation material shall be fire retardant conforming to FE103 – 99.
- All pipework and fittings shall be of 316 stainless steel. Compression fittings may be utilised for joints. Pipe insulation shall be as required to maintain desired water temperature. All pipework shall be supported as per relevant Australian Standards and/ or as per manufacturer's recommendations.
- Electrical wiring shall conform to RailCorp Specifications FE 106 – 97 and Electrical Equipment FE 126 – 97. Cable size to be min. 2.5 mm Sq. All circuitry shall be protected from overload of any kind.
- The Contractor shall design the system so it delivers water of potable quality at all times.
- The equipment shall not exceed noise levels of 40 dB at any time.
- The Contractor shall design, supply and install all necessary equipment in accordance with relevant Australian Standards and Statutory requirements i.e. pressure reducing and backflow prevention valves.

E2.5 New Chilled Water System Particular Requirements

Dependent on the particular system design the following requirements also apply:

- All main components of the system shall be designed for easy removal i.e. piping connections to tank by SS. flexible hoses, electrical connections to main component by Cannon plug etc.
- The new compressor shall fit in the location of the old compressor under the carriage or within the existing cabinets utilised by the current chiller. The new compressor shall be mounted on or within suitable frames.
- The Purchaser may accept alternatives where the new chilled water system will not fit within the existing enclosures cavities provided the Contractor provides details of and obtains approval for the enclosure. The enclosure shall be designed, supplied and installed to match existing materials and colours. The design shall conform to Environmental and Operating requirements.

- The Contractor may incorporate the current chilled water dispenser or may design and supply a new dispenser set. The Contractor shall ensure that the design precludes infection being transmitted from user to user and that the system shall not cause injury to a person while in use when the carriage is moving or stationary.
- If fans are required for chilled air distribution and/or heat exhaustion these shall be DC supply and of metal bodies. Air direction shall be clearly marked.
- Excessive heat shall be exhausted externally from the carriage.
- All pipes and valves shall be supported as per manufacturers' recommendations.
- Most of dispenser taps were replaced by RailCorp staff. All old style taps (off white cap) shall be replaced by the Contractor. New Enware taps will be free issued by the Purchaser.

E2.6 New Filtration System

The new filtration system for the water reticulation shall meet the following requirements in addition to other specified requirements

- A "single point" filtration system shall service each carriage.
- The filtration equipment shall be housed in a suitable enclosure preventing damage, but enabling easy service access.
- the filtration system shall be water filters certified to safely remove giardia, cryptosporidium, legionella and dissolved heavy metals.
- Filtration equipment shall have an inbuilt visual or audible device advising that the filter element require service and/or changing.
- Filtration equipment shall be environmentally friendly requiring only the change of the active element (if present)

E3. SEPARABLE PORTIONS

The work under this Contract is divided into 2 Separable Portions (SP) for both Options, whereas:

Option 1 - supply new systems only, and

Option 2 – renewal, supply, installation and all associated works

E3.1 Separable Portion 1 : Provision of Prototype

Separable Portion 1 comprises design, supply and delivery (and installation) of one Prototype of chilled water system and a new filtration system for the reticulated water system.

Complete the initial car for review and appraisal by the Purchaser. The Contractor shall supply all “As Built” documents within one week of completing the first car.

Time: 8 weeks from the date of award of Contract.

E3.2 Separable Portions 2 to 60 Trailer Cars

Separable Portion 2 comprises completion of any work on the prototype to bring it to completion and all works on the remaining 59 trailer cars. Of the various car types nominated in E1.2 and provision of all spares.

Time: Each Trailer Car shall be completed within one-week period concurrent with the activities carried out by the Main Contractor.

The Contractor shall provide all necessary test certificates and “As Built” documentation 5 working days prior to the date for delivery of each Separable Portion.

E4 GENERAL DESIGN AND INSTALLATION REQUIREMENTS

E4.1 General

All Equipment supplied under the Contract shall comply with relevant RailCorp/StateRail Specifications (including FE103, FE116, FE117, FE126, FE106, and Australian Standards (*See AppendixE 2 to E6*). Quality shall be Assured (AS3900 series or ISO9000 series).

Unless otherwise directed the latest version of all Standards shall apply.

Unless unobtainable all electrical terminals shall be screwless “Snap-on” type. Wires shall be terminated with Bootlace Pins, colour to match appropriate cable size.

All equipment shall be designed to operate reliably within the RailCorp operational areas including but not limited to environmental extremes of temperature, humidity, pressures and vibration that could be encountered when the equipment is in storage or installed in a car and under worst case operating conditions.

All equipment mounting and holding down details shall be designed so that the equipment will remain securely fixed in place and in extreme circumstances including carriage roll over. A Certificate shall be provided from an appropriately qualified engineer.

As far as practicable the Equipment shall be designed to operate in a "fail-safe" mode and the failure of one system or component shall not result in the failure of another system or component.

The Equipment shall be designed to minimise the risk of vandalism and shall not be adversely effected by graffiti, graffiti remover or cleaning agents utilised by the Purchaser.

All the exposed Equipment, controls and labelling shall be robust, fire and vandal resistant.

The Equipment, components or assemblies shall not present any sharp points or edges against which persons may be injured or clothing caught.

The Equipment shall not generate or cause to occur any noise, electrical or electro magnetic interference which may affect crew, passengers, bystanders or other equipment whether within or without the carriage.

The Equipment shall not be susceptible to any interference or noise encountered in operation.

The Equipment shall be designed so that individual items shall not suffer any damage when transported or stored on a flat level surface.

The Contractor shall verify for himself the equipment clearances, locations, cable routing, physical, wiring and schematic diagrams.

The Contractor shall not interfere with or modify circuits or equipment other than those included in the Contract.

E4.2 Modular Construction

The Equipment under the Contract shall be modular and installed as a complete unit.

A minimum number of components shall be used to keep modules as simple as possible, with a minimum number of terminals and connections.

The Equipment modules shall be readily replaceable ie. it shall be simple and quick for authorised staff to change out a module.

All modules, assemblies or components for the same function shall be interchangeable.

All the Equipment or modules required to be removed from their normal position in the car by one (1) person shall not exceed 16 kg in mass.

Equipment or modules of more than 16 kg mass shall be designed for removal by additional persons or by the use of commonly available material handling equipment such that the lifting force exerted by any single person shall not exceed 160 Newtons.

The equipment shall require a minimum of tools to fit and maintain. The requirement for special/sophisticated tools shall be minimised.

E4.3 Maintainability and Reliability

The design of the Equipment shall be based on providing the highest levels of maintainability and reliability.

It shall be quick and simple to check the Equipment and determine if a fault exists.

It shall be quick and simple to determine which module or assembly is defective.

It shall be quick and simple to determine that repaired equipment is functioning within the specification and design limits.

No calibration adjustments shall be necessary after installation or exchange of equivalent modules.

All the Equipment supplied under the Contract shall be designed to operate reliably, without attention other than visual inspection.

All hardware, finishes and seals shall also have a minimum 20 year life within the operating environment.

If more than 10 percent of the systems, Equipment or subassemblies of the same type fail in the 12 month period after being in service for more than one (1) month or an obvious failure trend is developing then it shall be deemed that a design fault exists. All such systems, equipment or subassemblies shall be replaced with redesigned units at no cost to the Purchaser either in material or removal and re-fitment costs.

E4.5 Labelling

All separable items of the Equipment shall be clearly and permanently labelled in a suitable location.

Labelling shall be vandal resistant and not adversely affected by RailCorp cleaning agents, graffiti or graffiti remover.

Labelling shall include the Equipment designation, model number, revision code, serial number, manufactures name and phone number, terminal or connector designations, supply voltage and current drain when operating and the function of indicators and controls.

Printed circuit boards shall have terminals, test points, component locations and component numbers marked.

The Equipment shall be marked with the date of dispatch to RailCorp or where manufacture and dispatch occur in the same month the year and month of manufacture is sufficient.

No identifying or advertising logos shall be used.

E4.6 Cable & Wiring

The installation of cables supplied by the Contractor shall comply with the requirements of FE049 (E105), FE116, AS3000 and other Australian Standards where appropriate.

The cable to be used on the car and equipment shall be:

- 2.5 mm² - 250/440V50/025 - single core unsheathed for general wiring within the car.

Other cable sizes will be considered, consistent with RailCorp FE Specifications (Clause E4.1).

All cables used shall be flexible and suitable for a vibrating environment.

The termination method used shall be consistent with the cable size

All new cables, conduits and junction boxes shall be approved for use in Railway applications. They shall be of the fire retardant type exhibiting properties of low smoke and minimal emission of halogen and toxic gases in fire situations and low flame propagation characteristics (based on AS1530-3 with characteristics approaching 0,0,0,4) and shall be self extinguishing on removal of flame.

All wiring shall be clearly and indelibly marked at each end to enable easy identification. All terminals will be labeled to the corresponding wire numbers.

The relationship between the colour, usage and identification of the cable shall be consistent.

All cables shall be terminated with enough length to allow re-termination at each end at least three (3) times, and as such as not to put stress on terminal points and/ or cables.

Cables shall be adequately supported to prevent fatigue and protected from abrasion against edges and equipment and the installation and usage of fasteners.

E4.7 Operational Conditions

The following standard operational conditions are provided for information and compliance where applicable. It is recognised that some do not apply for the work carried out. The Contractor shall advise the Purchaser of potential conflicts.

E4.7.1 Environmental Design Criteria

E4.7.1.1 Operating Environment

The XPT must be capable of continuous operation throughout the following range of climate and environmental conditions (described below), without degrading its life expectancy, suffering permanent damage or degrading its ability to achieve the performance characteristics of this specification. The environmental conditions that can be expected are described below.

E4.7.1.2 Ballast Impact

Equipment below the underframe sole bar must be designed to withstand, or be protected from, impacts from ballast up to 75 mm diameter at speeds of up to 130 km/h.

E4.7.1.3 Altitude

The XPT must operate at altitudes between 32 m below sea level to 1150 m above sea level.

E4.7.1.4 Ambient Temperature

The XPT must operate in air temperatures between -8 °C to +45 °C, measured in shade.

E4.7.1.5 Humidity

The XPT must operate in ambient air humidity typically between 35% and 100% relative humidity.

E4.7.1.6 Air Borne Pollution

The XPT must operate in the air pollution conditions encountered throughout the operational area, which may include ozone, diesel fumes, smoke and airborne particulates. The origins of smoke and particulates include bushfires as well industrial, domestic and commercial sources.

E4.7.1.7 Dust

The XPT must operate while subjected to wind driven dust at particle sizes from 1.4 µm to 100 µm.

E4.7.1.8 Wind

The XPT must operate without damage in continuous winds up to 80 km/h, with wind gusts up to 160 km/h with respect to the ground, in any direction.

E4.7.1.9 Rain

The XPT must operate under the conditions of average annual rainfall of 1150 mm/year with conditions varying from light drizzling rain of 1mm/hour to heavy rainfall storms of up to 100 mm/hour (over a continuous 5 minute period), where the pH of the rainwater ranges from 6.3 to 7.0.

E4.7.1.10 Hail

The XPT must not show noticeable or significant levels of damage by impacts of hailstones up to 40 mm diameter.

E4.7.1.11 Minor Flooding (for information only)

The XPT must operate with the rail flooded by water, up to 50 mm above Rail Level, at reduced speed.

E4.7.1.12 Lightning (for information only)

The XPT must operate under lightning conditions described in Appendix C, Lightning Strikes. The Contractor must provide a description of the precautions included in the design for review.

E4.7.1.13 Frost, Snow and Ice

Frost, snow and ice can be expected for air temperatures below 0 °C. The operation of the XPT must not be affected by falling snow or snow up to the top of rail height.

E4.7.1.14 Bird and Wildlife Strikes

The XPT must cater for occurrences of bird and wildlife strikes to equipment such as the coupling system, end of train electrical interfaces and the emergency terminal end access. All reasonable measures must be employed to ensure that damage will not occur thus causing incorrect operation in the event of a bird and wildlife strike at speeds up to maximum operating speed.

E4.7.2 Carriage Body Structure

The Body must accommodate passengers and crew and convey them, while maintaining them in an environment that is comfortable and safe.

E4.7.2.1 External Design Loads

The body structure must be designed to appropriate external design loads that take into consideration both normal operating conditions and abnormal conditions such as heavy shunts and minor to medium collisions including where derailment of the vehicle may occur.

The car body complete must be capable of supporting itself statically resting on the gondola structure without any loss in internal car dimensions.

All external design loads must include an appropriate margin of safety.

E4.7.2.1.1 Compressive Longitudinal End Load.

The car body structure and attachments must be designed to withstand a static compressive longitudinal end load of 1.5 MN applied to the centreline of the coupler without exceeding the safe working stress for any member.

E4.7.2.1.2 Tensile End Load.

The car body structure and attachments must be designed to withstand a static tensile end load of 1.5 MN applied to the centreline of the coupler without exceeding the safe working stress for any member.

E4.7.2.1.3 Vertical Loads.

The car body structure and attachments must be designed to withstand vertical loads consisting of:

- a) weight of car body (with all equipment fitted and full water and storage tanks),
- b) passenger crush load, and
- c) dynamic effects without exceeding the safe working stress for any member.

E4.7.2.1.4 Combined Loads.

The car body structure and attachments must be designed to withstand the above combined longitudinal compressive end load and vertical loads without exceeding the safe working stress for any member. The car body structure and attachments

must be designed to withstand the above combined longitudinal tensile end load and vertical loads without exceeding the safe working stress for any member.

E4.7.2.1.5 Lifting Loads.

The car body structure and attachments must be capable of being lifted in the tare condition with bogies from the centre of either headstock or coupler mounting without exceeding the critical design stress for any member.

The car body structure and attachments must be capable of being lifted in the tare condition with bogies from the lifting pads without exceeding the safe working stress for any member.

The car body structure and attachments must be capable of being lifted in the tare condition with bogies from the lifting pads in the vicinity of the car body bolsters, without exceeding the safe working stress for any member. Lifting of the car on a car diagonal is not a requirement of this clause.

E4.7.2.1.6 Loads on Car Body Attachments.

The car body structure and attachments must withstand a 5g longitudinal, 2g lateral and 2g vertical acceleration over and above gravitational acceleration acting on any bracket, fixing, partition, interior or exterior fittings or anchorage without exceeding the critical design stresses for any member.

Where applicable, the above components must also be designed using a fatigue methodology that prevents fatigue failure over the life of the XPT.

E4.7.3 Fire Resistance and Toxicity

Materials used in the XPT must be, wherever possible, fire-resistant in accordance with the Principal's Specification FE 103-99. Materials in this case refer to all those internal to the car including all seat, wall, floor, ceiling and insulation materials as well as any materials both internal and external that may be a hazard to passengers or staff in a fire or smoke situation.

It is recognised that some materials which meet other requirements may not fully meet the requirements of FE 103-99. In these cases, the Contractor must submit a trade-off study, for consideration by the Principal, to justify the selection of the material and to show how the material is the most overall suitable for the particular application.

A peak fire heat release rate must be calculated for each car type and must not exceed 30MW. The peak fire heat release rate must be the maximum of the summed rates for each material at each point in time during the combustion of each material. The heat release rate must be generally derived in accordance with AS 3837 cone calorimeter method with the specific test to be agreed with the Principal. All exposed interior materials must be considered, however, for the peak fire heat release calculation only, a material which, in total, makes up less than 0.7 square metres of total surface area within a car type, may be exempted from the calculation, subject to agreement by the Purchaser.

Toxicity levels of all materials to be used on the XPT must be minimised, consistent with the other constraints of this specification. Toxicity values, and the quantity and location of each material used must be provided for review prior to the CDR.

Toxicity must be measured in accordance with the requirements of NF X 70-100. The methodology for application of the standard is to be review by the Principal. An acceptable level of toxicity per car volume for each gas measured under NF X 70-100 must be established in accordance with the general requirements of BS 6853 and reviewed by the Principal.

E5. INSPECTION AND TESTING OF EQUIPMENT AND SYSTEMS

The inspection and testing shall consist of:

Prototype Testing at manufacturer's premises, in cars at depots and in service.

Type Testing to approved standards at the manufacturer's premises or laboratory.

Routine Testing prior to acceptance of each toilet to ensure that the approved design has been correctly reproduced.

E5.1 Prototype Testing

Prototype equipment shall be subject to factory testing under simulated conditions of operation to demonstrate operating functions and design criteria have been met in accordance with the Contract.

Subsequently the Contractor shall supply and assist in the installation and commissioning of production prototype unit for in-service trial (testing) to confirm performance of the units and to confirm operational or installation issues have been successfully addressed prior to manufacture and supply of the production units.

The Contractor shall provide support for its equipment during these in-service trials to address any problems which become evident as soon as practical and in any case within one working day.

The in-service trial shall be concluded after at least two (2) weeks of satisfactory continuous operation of the equipment without failure or degradation.

E5.2 Type Testing

All types of equipment and systems included in the work under the Contract, shall satisfactorily complete Type Testing prior to commencement of manufacture and supply of equipment. Type Testing shall be performed on a minimum of one (1) toilet.

- Mandatory Type tests required to be carried out by the Contractor:
- Full Function Test and Compliance Check: Demonstrate working functionality and construction compliance of the toilet system specified in the contract.
- Short Circuit Test;
- Insulation Test
- Noise Immunity
- Fast Transient Test (Voltage Spikes, Severity Level 4, all inputs)
- Electrostatic Discharge

All tests where applicable shall be carried out in accordance with the relevant part of AS 1099 or IEC 68 Environmental Testing Procedures for Electro-technology or other industry standard acceptable to the Engineer. Criteria will be the performance requirements stated in this Contract including its attached or referenced specifications.

Unless otherwise specified or required by the Contractor's Quality System, all Type Testing required under the Contract shall be carried out by an approved member of the National Association of Testing Authorities, Australia (NATA).

E5.3 Acceptance Testing

Each system or item of the Equipment effected by work under the Contract, shall be fully tested and its performance and compliance with the Contract Certified by the Contractor prior to acceptance of the work by the Engineer.

E5.4 Testing – General

The Contractor shall produce prototypes of all equipment and systems upon which testing and review shall be completed to the satisfaction of the Engineer before production may commence.

Any proposal by the Contractor to modify equipment after commencement of testing shall be justified by the Contractor as to the advantages to the Purchaser and the impact on the testing and may result in the recommencement of testing. All type testing shall be completed on the same unit.

The Contractor shall clearly state any differences between any the tested equipment and the production equipment and any impact on performance, reliability and compliance with the Contract due to those differences.

The Contractor shall submit test procedures to the Engineer for Prototype, Type and Routine testing to clearly demonstrate that following installation the systems and equipment installed function as required under all foreseeable environmental conditions, modes of operation and manipulation of controls.

E5.4.1 Test Procedures and Reports

The Contractor shall specifically submit to the Engineer, for review, proposed testing procedures for all testing and trials including type and acceptance testing with an explanation of the tests and expected results, at least four (4) weeks prior to commencement of testing.

The Contractor shall provide a test results summary spreadsheet including the following information, for all equipment tested up to that date, together with the regular Progress Report required in Part D, or as required by the Engineer:

- Equipment designation
- Test Procedure
- Quantity of each type of equipment tested
- Quantity of test failures for each type of equipment tested
- For each test parameter:
 - Minimum test value
 - Maximum test value
 - Target value (equal to or better than the specified value)
 - Requirement for the Contract.

The information shall be in a format suitable to the Engineer and shall include a copy signed by the Contractor and a full copy of all results on standard high density (1.44 Mbyte) 3.5 inch computer disk or CDROM suitable for usage in Microsoft Excel and importation to Microsoft Access for IBM compatible computers with Windows NT4 SP6.

E5.5 Test Failure Procedure

If during testing, as required under the Contract, any Equipment does not meet all of the performance or design requirements of the Contract, or if the test is unsuccessful due to other circumstances within the responsibility of the Contractor, the test shall be judged a failure.

In the event of a test failure, the Contractor shall promptly provide the Engineer with a Test Failure Report that describes the following:

- Equipment designation
- Test Description
- Test Details
- Description of Failure
- Failure Investigation
- Mechanics of Failure
- Cause of Failure Corrective Action Proposed
- Proposal for Retest

E5.6 Specific Testing

Testing shall include the following:

E.5.6.1 Chilled Water System

Provide certificate of compliance with Specifications.

1. Provide manufacturing Test Certificate including Certificate for Electrical Compliance
2. Visually inspect chilled water unit for defects
3. Inspect mounting connections
4. Test piping and taps for water leaks
5. Check wiring for continuity prior to connection of hot water system to power supply
6. Check that correct lugs or connectors were applied and that they function properly.
7. Check that there is sufficient cable length left to terminate (allow for three future re-crimps or re-terminations)
8. Check that cable is labeled correctly
9. Attach certification tag
10. Check that all cables are appropriately secured
11. Check that all equipment is fitted and installed correctly and in accordance with the scope and manufacturer's recommendations.
12. Check that correct water temperature was set
13. After power is connected retest supply
14. Run chilled water for 5 minutes and retest water temperature after 7 minutes
15. Provide signed and dated ITP for all testing and certification.

E6. DOCUMENTATION

The Contractor shall provide accurate, clear and compliant documentation.

E6.1 Purchaser's Drawings

A number of typical drawings for all types of XPT Trailer Cars, toilet compartment lay- out are listed and included in the Appendix. The drawing list is not exhaustive.

Drawings may not be available for all parts of the car.

The Contractor shall verify for themselves the physical and wiring aspects.

E6.2 Drawings by Contractor

The Contractor shall provide drawings for the chilled water system and the filtration for the water reticulation system. Drawings shall be provided prior to installation of the prototype.

Preparation

Drawings shall be prepared by the Contractor in accordance with Standards Australia Standard AS 1100 series in metric units and scale. Unless otherwise approved in writing by the Purchaser, drawings shall be prepared in digital format by the CAD process on 3.5 inch floppy disk (preferred) or CDROM in a format compatible with Autosketch, AutoCad LT and Autocad for IBM compatible computers using Microsoft Windows.

Workshop drawings shall be prepared to show complete details of each assembly, component and connection together with all information relative to materials of construction, surface treatment and/or finish and method of fabrication, and installation.

Dimensions of all elements and clearances and the like shall be clearly shown.

The drawings shall provide sufficient descriptive detail so that work, normally hidden from view, can be readily located and identified.

Drawings including layouts, general arrangements and component groups shall be prepared with sufficient detail for repair, overhaul and remanufacture of all components included in the work under the Contract.

Detailed physical, schematic and wiring diagrams shall be prepared for each mechanical, pneumatic and electrical component, module or switchboard.

All drawings prepared for the work under the Contract shall be uniquely referenced and numbered.

Unless otherwise agreed by the Engineer in writing, all drawings produced for the work under the Contract shall utilise the standard RailCorp title block and shall be registered at RailCorp Passenger Fleet Maintenance and shall prominently display

the RailCorp supplied drawing number in the title block as the primary drawing number.

A full listing of all drawings produced for the execution of the work under the Contract including the drawing number, title, revision designation, revision date, drawing type, size and a description of the revision shall be supplied to the Engineer with the initial drawings for review and updated as drawings are created or revised.

The drawing information shall be in a format suitable to the Engineer and shall include a copy signed by the Contractor and a full copy of all CDROM suitable for usage in Microsoft Excel and importation to Microsoft Access for IBM compatible computers with Microsoft Windows software.

E6.3 Submission of Documents

Notwithstanding anything to the contrary in Annexure to Part C General Conditions of Contract the Contractor shall submit three (3) quality copies of each drawing or document to the Engineer for review. One commented copy will be returned to the Contractor.

Approval relates only to the requirement of the Engineer regarding design intent and the Contractor remains responsible for the adequacy of the design for the intended purpose, the dimensional accuracy of the design and drawings, the assembly of the components and the completeness of the work in accordance with the Contract.

After making any comments, amendments or corrections the Contractor shall provide the Engineer with three (3) copies of each working drawing or document to be received by him at least two (2) working days prior to commencement of any work detailed thereon.

E6.4 Installation Drawings and Installation Procedures

Subsequent to the Date for Delivery of the first set of prototype equipment but within thirty (30) days of that date the Contractor shall supply suitable Installation Drawings and Installation Procedures for the work.

Prior to the Date for Practical Completion and following completion of the work, the Contractor shall revise all drawings to show the work as executed.

The Contractor shall supply to the Purchaser all relevant drawings in the form of:

- two (2) sets of full size paper copies.
- one (1) set of drawings on 3.5" floppy discs or CDROM .
- one set of standard (RailCorp) plastic reproducible transparencies of the same size as the above paper copies.
- one set of standard (RailCorp) microfilm cards.

Component changes prior to issue of the Final Payment Certificate by the Engineer shall require the Contractor to supply new drawings to replace or supplement those previously supplied. Where the component changes are not the responsibility of the Purchaser the supply of the new drawings shall be to the Contractor's account.

E7. OPERATION AND MAINTENANCE MANUALS

The Contractor shall provide Operation and Maintenance Manuals for the work under the Contract.

The Contractor shall update/ re-supply any document supplied under the Contract and effected by component changes during the Defects Liability Period.

E7.1 Provision of Documents

The Contractor shall supply full documentation for:

- Level 1: Operating instructions and safety aspects, generally for train crew
- Level 2: Preventative maintenance, routine calibration, Inspection and testing procedures for Maintenance Centre staff, including comprehensive fault diagnosis and rectification procedures as well as the Level 1 documentation.
- Level 3: Servicing, removal, repair, overhaul, installation and commissioning instructions for equipment by Maintenance Centre.

The documentation shall be clear, concise and suitable for each target group.

The documentation shall include a listing of all tools and instruments required to carry out the work on the car/equipment at the relevant Level.

The documentation shall include the characteristics, ratings and operating limits for each item of equipment (module) and any special tools, techniques or equipment required and a list of Safety and Emergency Procedures.

The documentation (Level 3) shall for each module contain a table of components including the following details: the component name, type, rating, part number, reference number (for the drawings), manufacturer, supplier, supplier details and a listing of relevant documentation and drawings.

The Level 2 documentation shall include a subsection for inspection and repair by the Maintenance Centre staff who attend in service failures and are required to fix a reported defect within approximately 15 minutes of attending the train in service (first preference) or make the train "safe" to allow it to continue in operation (second preference) or work out of service for Maintenance Centre attention.

The documentation shall include explanations of how the equipment works, why items are inspected, what is being determined, anticipated failure modes and preventative maintenance steps.

Each maintenance requirement and its frequency shall be justified and explained on the specific deterioration modes it is intended to correct.

The documentation shall include a list of statutory requirements for testing, inspection, maintenance and recommissioning of equipment and associated services and incorporate these requirements in the procedures.

The manual shall take a direct and positive approach, with detailed instructions for every task that a maintainer may have to perform. The instructions should be presented in a comprehensive and logical sequence. Any actions that must (or must not) be carried out prior to a certain task must be listed before the instructions for that task. Instructions for fault finding shall be in a form that will enable a fault to be located in the shortest possible time.

Actions which could result in grossly inefficient operations or equipment damage should be set out in the text at the most appropriate point, preceded by the word "Caution", and should be in a text that stands out from the body of the text.

The general form shall be A4 size with paper weight of at least 70 gsm and allow for easy insertion of amendments.

The Operators manual (Level 1) shall either be supplied in A5 size or in A4 size but in a format suitable for reduction to A5 size.

The manual shall lie open on a surface without being held.

The Manuals shall be well illustrated to assist with the identification of components, their location within the equipment, their disassembly, assembly, installation, operation and normal and faulty condition.

Drawings, figures, photos or the like shall either be on a single page or so arranged as to minimise folding.

All drawings, figures, photos or the like shall be uniquely referenced and include a title or brief description of their content.

The documentation shall contain a table of contents and be well indexed.

A copy of the documentation shall be supplied on 3.5" floppy disc or CDROM in a format compatible with Microsoft Word (Office 97) for IBM compatible computers using WinNT4 SP6.

Notwithstanding the date for submission of the Manuals stated in the Specification for Operating and Maintenance Instructions, a suitable draft Manual shall be delivered to the Engineer seven days (7) prior to the Date for Delivery of the each Separable Portion and the Final Manual seven (7) days prior to the Date for Practical Completion.

APPENDIX E1 DRAWINGS

<i>Item</i>	<i>Description</i>	<i>Date - Rev</i>
Drg No. 1259 - 1264	Calorifier, Water Cooler and Crew Heater Circuit Diagram	21/09/2001
CRP-41001 p27	Configuration Diagram of Trailer, Guards Trailer and Buffet Trailer Cars (Fig.1)	1/08/1982
CRP-68008 p1	Locker, Iced Water, Vestibule (Fig. 1)	1/01/1983
CRP-68008 p2	Locker, Iced Water, Vestibule (Fig. 3 and Fig. 4)	1/01/1983
Drg No. 658-010420	Dispenser assembly - Iced Water	20/01/1993 - B
Drg No. 800 032821	XPT Sleeper Car - Underframe Equipment Layout	26/09/2001
CRP-68008 p3	Locker, Iced Water, Vestibule (Fig. 5 and Fig. 6)	1/01/1983
CRP-58001 p2	Evaporator Assembly (Fig. 1)	1/10/1981
CRP-58001 p3	Control Panel Assembly (Fig. 2)	1/10/1981
CRP-58001 p4	Condensing Unit Assembly (Fig. 3)	1/10/1981
CRP-68008 p4	Locker Piping Schematic Fig. 7 - Marked Up by RailCorp	1/10/2001
NNNNN	Water Chiller Locker - Plan View	2/10/2001
NNNNN	Chilled Water - Typical Compartment for XL Cars - Plan View	25/10/2005
NNNNN	Chilled Water - Typical Compartment for XAM, XF, XBR and XFH Cars - Plan View	25/10/2005
	Chilled Water - XF Cars	25/10/2005
Sh. 1 of 2	Chilled Water - XBR Cars	25/10/2005
Sh. 2 of 2	Chilled Water - XBR Cars	25/10/2005
Sh. 1 of 2	Chilled Water - XAM Cars	25/10/2005
Sh. 2 of 2	Chilled Water - XAM Cars	25/10/2005
	Chilled Water - XFH Cars	25/10/2005
Sh. 1 of 2	Chilled Water - XL Cars	25/10/2005
Sh. 2 of 2	Chilled Water - XL Cars	25/10/2005
	Compressor	25/10/2005
CRP-88011 p1	Underframe Equipment, Trailer Cars	1/06/1982
CRP-88011 p2	Underframe Equipment, Trailer Cars	1/06/1982
CRP-88011 p3	Underframe Equipment, Trailer Cars	1/06/1982
CRP-74002	Cold Water Tank Assembly	1/06/1982
CRP-88015 p1	Equipment, Water Raising (Fig. 1)	1/11/1983
CRP-88015 p2	Equipment, Water Raising (Fig. 2)	1/11/1983
CRP-88015 p3	Equipment, Water Raising (Fig. 3 and Fig . 4)	1/11/1983
CRP-88011 NN	Inverted View 'A End' - Sh. 1	1/06/1982
CRP-88011 NN	Inverted View 'A End' - Sh. 2	1/06/1982
CRP-88011 NN	Inverted View 'B End' - Sh. 1	1/06/1982
CRP-88011 NN	Inverted View 'B End' - Sh. 2	1/06/1982

APPENDIX E2 (FE103)

SPECIFICATION FOR FLAMMABILITY REQUIREMENTS FOR MATERIALS USED IN THE CONSTRUCTION AND FITTING OUT OF PASSENGER ROLLING STOCK

SPECIFICATION FE 103 – 99

APPENDIX E3 (FE116)

GENERAL PRINCIPLES, CONSTRUCTION, MOUNTING AND INSTALLATION OF ELECTRIC EQUIPMENT FOR PASSENGER ROLLING STOCK

SPECIFICATION FE 116 – 97

APPENDIX E4 (FE117)

ELECTRIC CIRCUITS AND EQUIPMENT FOR PASSENGER ROLLING STOCK

SPECIFICATION FE – 117-97

APPENDIX E5 (FE126)

GENERAL SPECIFICATION FOR ELECTRONIC EQUIPMENT

SPECIFICATION FE – 126 –97

APPENDIX E6 (FE106)

WIRING AND CABLE SPECIFICATION FOR NEW PASSENGER ROLLING STOCK AND EQUIPMENT

SPECIFICATION FE – 106 -97