Roads

Master Specification

RD-ITS-S3 ITS Enclosures

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Contents

RD-ITS-S3 ITS Enclosures

1 General

1.1 This Part specifies the general requirements for the supply and / or installation of ITS Enclosures (including telecommunications field cabinets) for Intelligent Transport Systems (ITS) and associated Equipment such as electrical switchboards. This Part shall be read in conjunction with RD-ITS-D1 "Design for Intelligent Transport System (ITS)", RD-ITS-S1 "General Requirements for the Supply of ITS Equipment" and if installation forms part of this Contract, RD-ITS-C1 "Installation and Integration of ITS Equipment".

1.2 Documents referenced in this Part are listed below:

a) AS/NZS 1170 Structural Design Actions.

b) AS 1627 Metal Finishing – Preparation and Pretreatment of Surfaces – Method Selection Guide.

c) AS/NZS 1664 Aluminium Structures.

d) AS 2700 Colour Standards for General Purposes.

e) AS 3990 Mechanical Equipment – Steelwork.

f) AS 4100 Steel Structures.

g) AS 60529 Degrees of Protection Provided by Enclosures (IP Code).

h) AS/CA S009 Installation Requirements for Customer Cabling.

i) AS/NZS ISO 9001 Quality Management Systems – Requirements.

2 Quality Requirements

2.1 All supplied equipment shall be manufactured under a quality system certified to AS/NZS 9001.

2.2 The Contractor shall prepare and implement a Quality Plan, in accordance with PC-QA1 "Quality Management Requirements" that includes or annexes the following documentation:

a) design documentation in accordance with RD-ITS-D1 "Design for Intelligent Transport System (ITS)";

b) sample(s) for acceptance in accordance with RD-ITS-S1 "General Requirements for the Supply of ITS Equipment", Clause 3 "Equipment Requirements";

c) drawings, manufacturer's specifications and diagrams; and

d) where cooling systems are provided, the Factory Acceptance Test Plan for that system.

2.3 If not submitted beforehand, the documentation and samples required by this Clause shall be submitted at least 20 working days prior to the commencement of site work or placing an order for the Equipment.

2.4 Provision of the documentation and sample(s) listed in this Clause shall constitute a **Hold Point**.

3 Design Requirements

General

3.1 All Enclosures provided under the Contract shall be designed and constructed so as to present a neat and consistent appearance and so that wind, traffic or other induced forces or vibrations do not impair the performance of any Enclosure or the Equipment it houses. Drain holes shall be provided in the bottom corners of all Enclosures or any place where water could be dammed by framing members. Drain holes shall not compromise the IP55 rating of any Enclosure and shall prevent entry of vermin.

Dimensions

3.2 Unless otherwise specified:

a) Enclosures shall allow the Equipment to operate, and be maintained within the Enclosure on site;

b) a clear buffer space of at least 80 mm shall be provided between all Equipment and Equipment mounting arrangements, and the Enclosure walls and access cover(s) / door(s);

c) equipment within any Enclosure shall not be greater than 1800 mm above the standing surface for maintenance personnel; and

d) equipment in ground mounted Enclosures shall be a minimum of 200 mm above finished ground level.

Design Loads

3.3 Design loads shall be in accordance with AS/NZS 1170.1 and AS/NZS 1170.2.

Lifting and Transportation Points

3.4 Where the fitted-out Enclosure (including all operational Equipment such as batteries) cannot be manually lifted and held by a single person (within workplace health and safety limits) during installation, lifting anchors shall be provided. Anchors shall be capable of supporting the fitted-out Enclosure complete with all operational Equipment such as batteries. The lifting anchor(s) shall be integral with the Enclosure and prevent moisture ingress to the Enclosure. Seals around the lifting anchor(s) are not permitted. Where transportation anchor points are required, these shall be integral with the Enclosure.

Enclosure Access Points

3.5 The design and layout of the Enclosure shall enable full and safe access to the Enclosure and permit extraction of any of the internal Equipment and cables for installation, testing and / or maintenance purposes by a single technician, with due consideration of the mounting arrangement of the Enclosure.

3.6 Door(s) shall be provided on all metallic Enclosures.

3.7 Door(s) shall not be provided on non-metallic Enclosures.

3.8 The access cover / door and fixings shall be of sufficient strength, stiffness and design to prevent unauthorised entry. Doors shall not exceed 900 mm in width, but shall extend as far as practicable to the extremities of the Enclosure. Folding doors are not permitted. Enclosures, except for electricity mains pillar Enclosures, shall comply with the following:

a) cover fixings shall be captive with the cover when the cover is removed; and

b) an access cover / door that is accessible to the public shall be lockable, and flush with the Enclosure in the closed position.

3.9 Door(s) shall be hinged in the vertical plane using concealed hinges. Hinges shall be of a design such that the hinge pins cannot be removed. Door(s) shall be of the same material and finish as the Enclosure. Seals on outer-most doors shall close against the folded edge of a self-draining channel.

3.10 Doors shall also be able to be secured in the open position with a captive, non-sliding mechanism. Unless otherwise specified, door(s) shall be able to be secured open, at 140 degrees from its closed position.

3.11 Unless otherwise specified, Enclosure access points shall be mounted at a height that allows easy access for maintenance personnel when standing on the ground and / or gantry adjacent to the Enclosure.

Locks

3.12 Locks shall incorporate a Euro Profile locking cylinder (DIN 18254) with restricted keying or Lowe & Fletcher Barrel No. 380, Part No. A/CR32/01 WI3 lock, or equivalent. Two keys (keyed to the Principal's requirements) shall be supplied with each Enclosure.

3.13 Locking / unlocking of each door shall be effected by single key operation. The door lock shall operate a three point latching mechanism with pins extending from the top, centre and bottom of the non-hinged side of the door. Door(s) shall house a flush mounting, ergonomic handle capable of accepting the abovementioned lock.

Weather Resistance

3.14 All doors and openings in the Enclosure shall be provided with a durable and resilient weatherproof, neoprene seal that maintains its elasticity and memory over the specified life of the Enclosure in its operating environment. All Equipment contained within the Enclosure shall be protected from moisture, dust, dirt, and corrosion. In normal operational service, the Enclosure shall provide a degree of protection of not less than that required for the classification of IP55 in accordance with AS 60529.

Surface Finish of Enclosure

3.15 The surface of the Enclosure shall have a durable finish, which shall be achieved by either:

a) application of a surface treatment; or

b) the use of appropriate material for the Enclosure.

3.16 Where the Enclosure material does not require an applied finish to achieve the durability requirements, the Enclosure material shall be such as to allow an additional finish to be applied to the surface in the field without the need for special preparation.

3.17 Where an applied finish is provided, the Enclosure shall be treated with the appropriate surface or primer preparation for the material of construction. All fabrication, including welds, cuts, folds, drilling and the like shall be completed prior to such surface preparation. The primer / undercoat shall be applied to the surface in accordance with the manufacturer's specifications. The paintwork shall be a ripple-free finish of minimum 100 micron thickness, excluding surface preparations or primers. The paintwork shall be:

a) powder coat type for installations that are difficult to reach for surface maintenance, e.g. Enclosures mounted on a gantry or pole; and

b) wet paint type for all other areas.

3.18 Suitable washers shall be used to prevent damage to any surface treatments applied to the Enclosure or mounting structure.

Cable Management System

3.19 A horizontal and vertical, electrically-insulated, cable management system shall be provided within the Enclosure to enable cables to be installed, secured and augmented, or replaced in a neat and easy manner without damaging or replacing cable fixings. The cable management system shall not be filled in excess of 50% capacity at construction completion. Labels shall not be affixed to the cable management system.

3.20 Cables shall enter from the underside of the Enclosure through proprietary cable glands. Conduits shall be accordingly arranged to allow direct cable entry. The gland plate shall be easy to manoeuvre with only one hand with all cables installed in glands. More than one gland plate may be provided per Enclosure. Fixings shall be captive with either the gland plate or Enclosure.

3.21 Where access is not easy to both sides of the gland from the usual working access point, cable glands shall be installed in a removable gland plate of 3 mm thick aluminium. A 120 mm minimum cable zone, clear of any obstacles, shall be provided within the Enclosure beneath the gland plate. Cables shall be prevented from contact with sharp edges, and/or all surface(s) that may cause damage to the cable.

Danger Sign

3.22 Where an LV power source is connected / terminated within the Enclosure, a danger sign that complies with the relevant requirements of AS1319 shall be fixed to the inside of the access door.

Telecommunications

3.23 Enclosures that incorporate conduits for entry of telecommunication cables shall comply with the requirements of the AS/CA S009.

Local Facility Switch

3.24 Where provided, the facility switch shall be positioned to allow access without opening the Enclosure, and without compromising the “IPxx” rating of the Enclosure. Two keys shall be provided with each switch.

3.25 A label indicating the effect of each switch position shall be fixed adjacent the switch, such that the information aligns with the apex of the switch shaft for each available switch position. The information to be shown is as specified in the relevant ITS Technical Standards document.

Labels

3.26 Identification alphanumeric characters shall be adhered to the upper-right, outside corner of the fixed side of field cabinets so they can be seen when approached from the normal direction of travel on the carriageway. Characters shall be as typically provided for traffic signal controller cabinets. All other labels shall be fixed by screws adjacent to the respective Equipment. Screws in areas accessible to the public shall be of vandal-resistant design. The label shall be located such that it cannot be mistaken as referring to another device.

3.27 Labels shall be laminated plastic or brushed aluminium, coloured as follows:

a) Warning notices: White letters on red background.

b) Other labels: Black on white background.

3.28 Label lettering shall comply with the heights outlined in Table RD-ITS-S3 3-1.

Table RD-ITS-S3 3-1 Label Lettering Height

Label	Lettering Height
Name of Cabinet	15 mm
Equipment labels	6 mm
Warning notices	4 mm

4 Enclosure Internal Operating Environment

General

4.1 The Enclosure design shall maintain the ambient environment inside the Enclosure to within the rated operating conditions of the Equipment it houses, in all weather conditions and ambient temperatures likely to be experienced in the installed location. The layout of the Equipment shall maximise the cooling capabilities of each item of Equipment.

Air Exchange Cooling

4.2 Where air exchange cooling is used, the cooling system shall provide a positive pressure within the Enclosure, and use a filtered, forced air system which complies with the following:

a) fans and filters shall be easily accessed and replaced without disturbing other Equipment;

b) filters shall be replaceable without opening the Enclosure, but shall also be vandal resistant;

c) filters shall be of a type, to allow normal operation of Equipment within the Enclosure with annual filter replacement;

d) at least one filtered inlet vent shall be provided on opposite, fixed sides of the Enclosure at a minimum of 300 mm above ground level;

e) at least one filtered outlet vent shall be provided on opposite, fixed sides of the Enclosure at a maximum of 150 mm from the top of the Enclosure; and

f) fans shall be installed adjacent the inlet vents.

Equipment

4.3 Thermostats shall be of bi-metal sensor type with contact closures suitable for the electrical loads of the supplied cooling system. Each thermostat shall have a minimum set point range of 10ºC to 30ºC.

4.4 Filter material shall be classified EU4 in accordance with DIN 24185, and meet the following requirements:

a) Filter Material Density: 350 g/m2.

b) Filtration efficiency: 88%.

4.5 Inlet and outlet vents shall be sized to allow filters to have a minimum time between replacement of 12 months when operating in a roadside environment. Fan motors shall be of a construction that exhibits minimal amount of electrical noise output, and shall be EMC shielded to prevent interference with electronic component within the Enclosure. The fan motor and bearings shall be suitable for 100% operating duty in the intended operating environment. The fan motor and bearings shall have a MTBF of 45,000 hours based on intended use, at a 90% running duty cycle. Fans shall be of ball-bearing type.

4.6 Each thermostat shall operate the connected cooling device(s) once the internal ambient temperature (measured 100mm from the top of the Enclosure) reaches the set point.

4.7 A prototype of the Enclosure and cooling system to be provided under the Contract shall be subjected to Factory Acceptance Testing (FAT) to demonstrate compliance with the requirements of the Contract.

4.8 Provision of the FAT shall constitute a **Hold Point**.

Mounting Surface and Facilities

4.9 Ground mounted Enclosures up to and including the size of a Telecommunications Field Cabinet, shall be suitable for mounting onto a plinth having four mounting studs arranged in accordance with a traffic signal controller. Ground mounted Enclosures with size in excess of such a Telecommunications Field Cabinet, shall be provided with a suitable, custom made plinth and fixing arrangement.

4.10 The mounting studs shall be located within the Enclosure to provide protection from vandalism. All ground mounted Enclosures shall be mounted on a concrete plinth so as to be a minimum of 75 mm above the surrounding concrete working area specified in RD-ITS-C1 “Installation and Integration of ITS Equipment”. Conduit entries shall be via the bottom of the Enclosure in accordance with Clause 3 “Design Requirements”, “Cable Management System”.

5 Metallic Enclosure

Construction

5.1 The Enclosure and internal structure framework shall be constructed from steel or marine grade aluminium sheeting. All steelwork and fixings (except aluminium and stainless steel) shall be hot dip galvanized. The internal framework shall be contained entirely within the external sheeting. All external seams shall have a continuous weld. The sheeting shall be stitch welded to the internal structural frame. Welded steel joints shall be primed with zinc-rich primer.

5.2 Aluminium Enclosures shall be designed to AS/NZS 1664. Other metallic Enclosures shall be designed to AS 4100 for the limit state design, or AS 3990 for the working stress method. The design loads shall be in accordance with AS/NZS 1170.1 & AS/NZS 1170.2.

5.3 The alloy and temper of the aluminium shall be suitable for the application. Internal structural members shall be manufactured from the same material as the Enclosure.

5.4 Contact between dissimilar metals shall comply with the requirements of AS/NZS 1664. Suitable washers and fixings shall be used to prevent damage and corrosion to all surfaces and surface treatments applied to the Enclosure.

5.5 The Enclosure may be of either single or twin wall construction.

Surface Finish of Enclosure

5.6 Where a finish is applied to a surface other than aluminium, it shall consist of a zinc-rich primer applied to clean surfaces. Where a finish is applied to aluminium, shall be suitably treated as detailed in AS/NZS 1664 and AS 1627 with chromate conversion applied prior to the application of the finish.

5.7 Any deterioration to the surface finish due to atmospheric conditions and / or local environmental conditions shall not affect the structural integrity or visual appearance of the finished Enclosure, for a minimum period of 20 years. Colours shall be as defined in AS 2700:

a) Exterior colour: Smoke Blue (T33).

b) Interior colour: Smoke Blue (T33).

Storage Pocket

5.8 A metal pocket shall be provided on the inside lower half of each access door to provide space for the storage of small Equipment and site documentation. The pocket shall be at least 85 mm deep and sized to completely shroud unfolded, laminated A3 sized drawings with long edge in the horizontal plane. The pocket shall include at least two equi-spaced finger slots from within the bottom of the pocket to 50 mm from its top to assist in the removal of contents. The pocket shall be self-draining.

Cable Management – Additional Requirements

5.9 A cable management system shall be provided down the full height of both sides of the Enclosure adjacent to each access door and / or opening. The cable management system shall be capable of housing a 50 mm diameter cable loom as a minimum. It shall be installed such that it does not interfere with any Equipment or internal racking system. Additional horizontal cable management of a similar type to vertical cable management shall be provided as appropriate to house horizontal cable runs.

6 Enclosure Lighting

6.1 Each Enclosure shall be provided with internal fluorescent lighting suitable for performing maintenance activities within the Enclosure without the need for additional lighting. Illumination shall be from above each access door of the Enclosure and be prevented from directly spilling from within the Enclosure. Luminaires shall be:

a) rated between 8 watt and 15 watt (miniature lamps) or 36 watt (regular size lamps);

b) fitted with diffusers;

c) hard wired to the lighting sub-circuit; and

d) automatically operated in conjunction with the respective access door(s).

6.2 Luminaires shall be mounted such that they do not interfere with Equipment racking, cabling and maintenance activities.

6.3 Door switches shall be of weatherproof construction with a minimum rating of IP56. Each switch shall have two sets of contacts and a minimum MTBF of 10,000 switching operations.

7 Hold Points

7.1 The following is a summary of Hold Points referenced in this Part:

Document Ref.	Hold Point	Response Time
2.4	Provision of sample(s)	10 working days
2.4	Drawings, manufacturer's specifications and diagrams	10 working days
4.8	Factory Acceptance Test Plan for cooling system	10 working days

8 Verification Requirements and Records

8.1 The Contractor shall supply the following records:

Table RD-ITS-S3 8-1 Records

Document Ref.	Subject	Record to be Provided
RD-ITS-S1.11	Operational and Maintenance Manual(s)	Operation and maintenance manual(s)
RD-ITS-S1.13	Testing and Acceptance	Test results
RD-ITS-S1.14	System documentation	As-Built documentation