PART R65

ITS ENCLOSURES

CONTENTS

1. GENERAL

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 must be read in conjunction with Part R60 "General Requirements for the Supply of ITS Equipment" and if installation forms part of this Contract, Part R61 "Installation of ITS Equipment".

Documents referenced in this Part are listed below:

AS 1170	Structural Design Actions
AS 1627	Metal finishing - Preparation and pretreatment of surfaces - Method selection guide
AS 1664	Aluminium Structures
AS 2700	Colour Standards for general purposes
AS 3990	Mechanical Equipment - Steelwork
AS 4100	Steel Structures
AS 60529	Degrees of protection provided by enclosures (IP code)
AS/ACIF S009	Installation requirements for customer cabling

Note: a reference in this Part to a clause in Part R60 "Supply of ITS Equipment" is indicated by "R60." preceding the clause number.

2. QUALITY REQUIREMENTS

The Contractor must provide:

(a) sample(s) for acceptance in accordance with Clause R60.3 "Equipment Requirements";

(b) drawings, manufacturer's specifications and diagrams; and

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

If not submitted beforehand, the documentation and samples required by this Clause must be submitted at least 28 days prior to the commencement of site work or placing an order for the Equipment.

Provision of the documentation and sample(s) listed in this Clause shall constitute a **HOLD POINT**.

3. DESIGN REQUIREMENTS

3.1 General

All Enclosures provided under the Contract must 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 must be provided in the bottom corners of all Enclosures or any place where water could be dammed by framing members. Drain holes must not compromise the "IP55" rating of any enclosure and must prevent entry of vermin.

3.2 Dimensions

Unless otherwise specified:

(a) Enclosures must allow the Equipment to operate, and be maintained within the enclosure on site;

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

(c) Equipment within any enclosure must not be greater than 1800mm above the standing surface for maintenance personnel; and

(d) Equipmen`t in ground mounted Enclosures must be a minimum of 200mm above finished ground level.

3.3 Design Loads

Design loads must be in accordance with AS1170.1 and AS1170.2.

3.4 Lifting and Transportation Points

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 must be provided. Anchors must be capable of supporting the fitted-out enclosure complete with all operational Equipment such as batteries. The lifting anchor(s) must 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 must be integral with the enclosure.

3.5 Enclosure Access Points

The design and layout of the enclosure must 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. Door(s) must be provided on all metallic Enclosures.

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

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

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

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

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

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

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

3.6 Locks

Locks must 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) must be supplied with each enclosure.

Locking/unlocking of each door must be effected by single key operation. The door lock must 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) must house a flush mounting, ergonomic handle capable of accepting the abovementioned lock.

3.7 Weather Resistance

All doors and openings in the enclosure must 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 must be protected from moisture, dust, dirt, and corrosion. In normal operational service, the enclosure must provide a degree of protection of not less than that required for the classification of IP55 in accordance with AS 60529.

3.8 Surface Finish of Enclosure

The surface of the enclosure must have a durable finish, which must be achieved by either:

(a) application of a surface treatment; or

(b) the use of appropriate material for the enclosure.

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

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

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

(b) wet paint type for all other areas.

Suitable washers must be used to prevent damage to any surface treatments applied to the enclosure or mounting structure.

3.9 Cable Management System

A horizontal and vertical, electrically-insulated, cable management system must 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 must not be filled in excess of 50% capacity at construction completion. Labels must not be affixed to the cable management system.

Cables must enter from the underside of the enclosure through proprietary cable glands. Conduits must be accordingly arranged to allow direct cable entry. The gland plate must 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 must be captive with either the gland plate or enclosure.

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

3.10 Danger Sign

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

3.11 Telecommunications

Enclosures that incorporate conduits for entry of telecommunication cables must comply with the requirements of the AS/ACIF S009.

3.12 Local Facility Switch

Where provided, the facility switch must be positioned to allow access without opening the enclosure, and without compromising the "IPxx" rating of the enclosure. Two keys must be provided with each switch.

A label indicating the effect of each switch position must 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.

3.13 Labels

Identification alphanumeric characters must 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 must be as typically provided for traffic signal controller cabinets. All other labels must be fixed by screws adjacent to the respective Equipment. Screws in areas accessible to the public must be of vandal-resistant design. The label must be located such that it cannot be mistaken as referring to another device.

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

(a) Warning notices: White letters on red background;

(b) Other labels: Black on white background.

Label lettering must comply with the heights in 3.13.

Table 3.13 - Label Lettering Height	
Label	Lettering Height
Name of Cabinet	15 mm
Equipment labels	6 mm
Warning notices	4 mm

4. ENCLOSURE INTERNAL OPERATING ENVIRONMENT

4.1 General

The enclosure design must 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 must maximise the cooling capabilities of each item of Equipment.

4.2 Air Exchange Cooling

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

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

(b) filters must be replaceable without opening the enclosure, but must also be vandal resistant;

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

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

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

(f) fans must be installed adjacent the inlet vents.

4.3 Equipment

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

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

Filter Material Density: 350 g/m2;

Filtration efficiency: 88%.

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

Each thermostat must operate the connected cooling device(s) once the internal ambient temperature (measured 100mm from the top of the enclosure) reaches the setpoint.

A prototype of the enclosure and cooling system to be provided under the Contract must be subjected to factory acceptance testing (FAT) to demonstrate compliance with the requirements of the Contract.

Provision of the FAT shall constitute a **HOLD POINT**.

4.4 Mounting Surface and Facilities

Ground mounted Enclosures up to and including the size of a Telecommunications Field Cabinet, must 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, must be provided with a suitable, custom made plinth and fixing arrangement.

The mounting studs must be located within the enclosure to provide protection from vandalism. All ground mounted Enclosures must be mounted on a concrete plinth so as to be a minimum of 75mm above the surrounding concrete working area specified in Part R61 “Installation of ITS Equipment”. Conduit entries must be via the bottom of the enclosure in accordance with Clause 3.9 “Cable Management System”.

5. METALLIC ENCLOSURE

5.1 Construction

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

Aluminium Enclosures must be designed to AS1664. Other metallic Enclosures must be designed to AS4100 for the limit state design, or AS3990 for the working stress method. The design loads must be in accordance with AS1170.1 & AS1170.2.

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

Contact between dissimilar metals must comply with the requirements of AS 1664. Suitable washers and fixings must be used to prevent damage and corrosion to all surfaces and surface treatments applied to the enclosure.
The enclosure may be of either single or twin wall construction.

5.2 Surface Finish of Enclosure

Where a finish is applied to a surface other than aluminium, it must consist of a zinc-rich primer applied to clean surfaces. Where a finish is applied to aluminium, must be suitably treated as detailed in AS1664 and AS1627 with chromate conversion applied prior to the application of the finish.

Any deterioration to the surface finish due to atmospheric conditions and/or local environmental conditions must not affect the structural integrity or visual appearance of the finished enclosure, for a minimum period of 20 years. Colours must be as defined in AS2700:

exterior colour: Smoke Blue (T33)

interior colour: Smoke Blue (T33)

5.3 Storage Pocket

A metal pocket must 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 must be at least 85mm deep and sized to completely shroud unfolded, laminated A3 sized drawings with long edge in the horizontal plane. The pocket must include at least two equi-spaced finger slots from within the bottom of the pocket to 50mm from its top to assist in the removal of contents. The pocket must be self draining.

5.4 Cable Management – Additional Requirements

A cable management system must be provided down the full height of both sides of the enclosure adjacent to each access door and/or opening. The cable management system must be capable of housing a 50mm diameter cable loom as a minimum. It must 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 must be provided as appropriate to house horizontal cable runs.

6. ENCLOSURE LIGHTING

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

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

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

7. HOLD POINTS

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

CLAUSE REF.	HOLD POINT	RESPONSE TIME
2	Provision of sample(s)	7 days
2	Drawings, manufacturer's specifications and diagrams	7 days
2	Factory Acceptance Test Plan for cooling system	7 days

8. VERIFICATION REQUIREMENTS AND RECORDS

The Contractor must supply the following records:

CLAUSE REF.	SUBJECT	RECORD TO BE PROVIDED
R60.11	Manuals	Operation and maintenance manual(s)
R60.13	Cooling System	Factory Acceptance Test records
R60.14	System documentation	"As Built" documentation