

1. SCOPE

This document outlines a technical specification for prefabricated Glass Reinforced Plastic (GRP) enclosures designed to house outdoor rated equipment in secondary substations installed on the Company's 11kV and 6.6kV networks.

Prefabricated substation housings designed to house indoor switchgear, protection & control equipment and ancillary equipment is detailed within INS 50.40.11 which forms part of a separate tender.

2. ISSUE RECORD

This is a [Reference](#) document. The current version is held on the EN Document Library.

It is your responsibility to ensure you work to the current version.

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3. ISSUE AUTHORITY

Author	Owner	Issue Authority
Name: Ruairidh Chalmers Title: Project Engineer	Name: Fraser Shaw Title: Substations Manager	Name: Fraser Ainslie Title: Head of Engineering Design and Standards

4. REVIEW

This is a [Reference](#) document which has a 5 year retention period after which a reminder will be issued to review and extend retention or archive.

5. DISTRIBUTION

This document is not part of a Manual maintained by Document Control and does not have a maintained distribution list but is published on the SP Energy Networks website.

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7. REFERENCE DOCUMENTS

This specification makes or implies reference to the following documents. It is important that users of all standards, ENA Technical Specifications and other listed documents ensure that they are in possession of the latest issue, at the time of tender, together with any amendments.

7.1 International Electro-technical Commission Publications (IEC)

IEC 60529	Degrees of protection for enclosures
IEC 60815	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions
IEC 62271-202	High-voltage switchgear and controlgear – Part 202: High-voltage/low-voltage prefabricated substation
IEC 61936-1	Power Installations exceeding 1kV a.c. – Part 1: Common rules

7.2 Energy Networks Association Technical Specifications (ENATS)

ENATS 35-1	Distribution Transformers (from 16kVA to 1000kVA)
ENATS 37-02	Substation cable distribution boards
ENATS 41-36	Distribution Switchgear for Service Up To 36kV (Cable and Overhead Conductor Connected)

7.3 Energy Networks Association Engineering Recommendations (ENA EREC)

ENA EREC S40	Prefabricated substations
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7.4 Other Standards

BS 476-7	Fire tests on building materials and structures, Part 7: Method of test to determine the classification of the surface spread of flame of products
LPCB LPS 1175	Loss Prevention Certification Board Loss Prevention Standard 1175
BS EN ISO 14001	Environmental Management

7.5 SP Energy Networks Documents

SUB-03-029	Substation LVAC Installation Wiring Specification for new and refurbished substation sites
INS_50-42-06	Prefabricated enclosures for distribution substations
PROT-16-026	Distribution Bay Control Unit IED Protection, Control and Alarms Requirements
SUB-03-017	General Specification for the Civil Engineering and Building Design and Construction of Secondary Substations
ASSET-01-023	Substation Security Policy
TRAN-03-021	Specification for Distribution Transformers 6.6kV-11kV, 25kVA-1000kVA
SWG-03-025	Specification for 12kV Secondary Substation Switchgear and Metering Units

7.6 Iberdrola Network Specifications (INS)

INS 50.40.11	Pre-fabricated enclosures for distribution substations
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8. INTRODUCTION

This document outlines a technical specification for prefabricated GRP enclosures designed to house outdoor rated equipment in secondary substations installed on the Company's 11kV and 6.6kV networks.

9. DEFINITIONS AND STANDARDS

9.1 Definitions

For the purpose of this specification, the following shall apply:

<i>Approved</i>	Approved in writing by the Engineer.
<i>Company</i>	SP Energy Networks
<i>Engineer</i>	The Company's representative having authority over technical matters contained in this specification.
<i>Manufacturer</i>	The manufacturer of equipment supplied in accordance with the specification.
<i>Tenderer</i>	The supplier invited to tender in accordance with this specification.
<i>Unit Substation</i>	A substation with 11kV/433V or 6.6kV/433V unit transformer to ENATS 35-1, ring main unit to ENATS 41-36 and LV fuse board to ENATS 37-02. Other combinations of directly mounted attachments to the transformer may also be used.

9.2 International and British Standards

Equipment should preferably comply with all specified requirements. These include those in the British Standards, other primary standards listed in this specification, and all relevant ENA Technical Specifications. Where equipment is designed to an associated or equivalent standard, the Tenderer shall state in the tender all variations from the listed primary standard in equipment design or performance, and shall state the title of any associated or equivalent standard.

9.3 Equipment Components to be offered for Approval

Where components are specified in general terms, and specific types stated to be Approved items, equivalents may be offered for approval. This must however be made clear in the tender documents and sufficient information on the design and engineering performance of the equivalent components provided to enable a complete appraisal to be made.

Unless otherwise specified or Approved, all materials and equipment used in the contract works shall be in accordance with the latest revisions, at the time of tender, of such SP Energy Networks Technical Specification, Energy Networks Association Technical Specification, British Standards, ISO and IEC Standards as are applicable, in that order of preference.

10. GENERAL ENCLOSURE REQUIREMENTS

10.1 Enclosure Description

The prefabricated GRP enclosure to be supplied is intended to house one or more items of plant in a publicly accessible outdoor location. A number of standard enclosure dimensions are specified in Table 1, and provision shall be made for the less frequent ordering of non-standard types.

The proposed design shall be fit for the intended purpose and generally in accordance with the relevant provisions of IEC 62271-202 and ENA EREC S40.

10.2 Standard Enclosure Types

Table 1: Standard Enclosure Types

Typical Application	Type	Internal Dimensions (l x d x h) in metres	Type	External Dimensions (l x d x h) in metres
Housing for Unit Substation	A1	3.0 x 2.5 x 2.1	A	3.0 x 2.45 x 2.5
Housing for Unit Substation with adjacent metering equipment	B1	5.0 x 2.5 x 2.1 (Figure 1)	B	5.0 x 2.45 x 2.5
Housing for Unit Substation with adjacent metering equipment	C1	6.0 x 2.5 x 2.1 (Figure 2)	C	6.0 x 2.45 x 2.5
'Sentry box' housing for freestanding ring main unit			D	1.6 x 1.6 x 2.5
'Sentry box' housing for ring main unit + automation equipment			E	1.9 x 1.8 x 2.5
Housing for 3 panel extensible switchgear			F	2.1 x 1.6 x 2.5
Housing for 4 panel extensible switchgear			G	2.6 x 1.6 x 2.5
Housing for 5 panel extensible switchgear			H	3.0 x 1.6 x 2.5
Housing for Unit Substation with isolation transformer	I1	3.0 x 3.5 x 2.1	I	3.0 x 3.45 x 2.5
Housing for Unit Substation with isolation transformer and adjacent metering equipment	J1	6.0 x 3.5 x 2.1	J	6.0 x 3.45 x 2.5

The enclosures in Table 1 are standard enclosure types. Types A1, B1 and C1 shall be used in greater volume than Types A, B and C. Types A, B and C shall only be used in specific situations where extra height is necessary, e.g. when old enclosures need to be replaced but the existing switchgear will remain.

Enclosure dimensions that vary slightly from the above may be submitted for consideration. In all cases the clear internal dimensions shall be stated in the tender.

The Tenderer shall also price uplift costs as an option for the Company. These shall include:

1. Non-standard colours.
2. Brick Finish.
3. Inclusion of 4 leaf bi-foldable doors. 'Concertina' type design.
4. Inclusion of a partition in Type C and C1 housings.
5. Fitting of Danger of Death notices, SF₆ notices, Property Notice (Substation Nameplate) and fitting of padlocks. These items shall be fitted immediately following the installation. Where this option is agreed the materials shall be free issued to the Tenderer by the Company.

10.3 Installation Timescales

The Tenderer shall carry out the installation no later than 6 weeks after being notified by the Company.

10.4 Drawings and Design Details

A full specification and detailed fabrication drawing shall be submitted with the tender for approval before manufacture commences. The Manufacturer shall be able to offer a housing conforming to the requirements of this specification for inspection and approval before manufacture commences.

10.5 Security

In accordance with ASSET-01-023 an assessment of the security risk should be undertaken during the initial design phase. The use of a GRP enclosure may not be suitable where the risk classification of a site is 'High' or 'Higher than normal'. The proposed solution should be reviewed against ASSET-01-023 and where required agreed with the SPD/SPM Civil Asset Manager.

10.6 Service Conditions

The enclosure shall be designed for use under normal outdoor service conditions in accordance with clause 4.4.2.2 of IEC 61936-1 for Class "-25 outdoor" equipment (-25°C outdoor).

11. DESIGN AND CONSTRUCTION

11.1 Materials and Construction

The materials and components used in the construction of the enclosure shall be suitable for their purpose, correctly used or applied and sufficiently durable, taking account of normal maintenance practices, to ensure the health and safety of people.

The materials, fittings, components and other manufactured products or parts thereof must be supported by evidence of suitability, or when installed by an established method, must have recognised qualities and properties of suitability. Evidence of suitability could include the results of accelerated ageing or wear tests. The materials used in the fabrication and the relevant standards to which they conform should be detailed by the Tenderer.

Any ferrous materials used in the construction of the enclosure or its fittings, fixings and furniture shall be either alloyed to be corrosion resistant or protected from corrosion by a process proven by test to match the life expectancy of the enclosure. Evidence of this shall be submitted with the tender, and the exact use of this material detailed.

The materials, fittings, components and other manufactured products or parts thereof whose suitability depends upon proper maintenance, or periodic renewal, must be readily accessible or positioned so that replacement is reasonably practicable. All recommendations for maintenance and renewal requirements must be specified by the Tenderer.

The designed method of fixing the enclosure to a concrete plinth shall be submitted in the tender. This shall detail the design of the GRP structure at the fixing points, and include details and materials used for reinforcement at the fixing points. Proof of the "pullout" force on the supplied fixings shall be submitted and shown to be fit for purpose.

11.2 Degree of Protection

The enclosure shall be designed to prevent, so far as is reasonably practicable, third parties gaining access to the enclosed equipment.

It shall provide protection of the enclosed equipment against ingress of solid foreign objects and water to a minimum of IP23 with the doors shut, in accordance with IEC 60529. Evidence of type testing for ingress protection shall be provided.

11.3 Protection against Mechanical Stress

In accordance with clause 5.101 of IEC 62271-202, the enclosure shall have sufficient mechanical strength. Evidence shall be provided to prove that it can withstand the loads and impacts specified in clause 5.101 of IEC 62271-202.

11.4 Internal Fault

Failure of the equipment housed within the enclosure may initiate an internal arc fault. The enclosure shall be type tested, at an accredited short circuit test station, to the pass criteria for accessibility Class IAC-AB in accordance with clause 6.102 of IEC 62271-202 and as recommended in clause 4.3 of ENA EREC S40. The arc energy shall be 250MVA (13.1kA at 11kV) for 1 second.

The type test shall take place on the 'Type A1' and 'Type D' enclosures. For all other enclosure sizes that have not been type tested, a case must be made by the Tenderer to the Engineer explaining the suitability of each size for the intended application. The implication of significant design changes from the type tested enclosures must be detailed. These may include, but are not limited to, changes in: housing volume; door width; available roof lift; floor fixing or position; panel joint system; panel material composition; door locking systems; door fixings and ventilation grille type and position.

Enclosures which have been previously tested may have the type test evidence submitted for consideration at the time of tender.

11.5 Transport, Handling and Erection

Where required, enclosures shall be supplied flat packed in kit form, complete with all fixing bolts and brackets for assembly, including foundation bolts. The housings are to be packed in such a way as to be suitably protected from damage in transit and storage, particularly to flanges, corners and finished surfaces. Doors are to be preassembled and fitted into door frames. All components of the housing assembly to be palletised in such a manner that they can be individually handled by a fork lift truck.

The Manufacturer shall supply instructions on the safe transport, handling and erection for each specified enclosure type i.e. Example Risk Assessments and Method Statements detailing lifting equipment, vehicles used, acceptable weather conditions etc.

Each pallet shall be clearly marked with, in print legible from at least 2m away, the following information:

1. Manufacturer's Name
2. Manufacturer's Model Reference (if applicable)
3. Description of Item
4. Enclosure External Dimensions
5. Pallet number. This must be in the form "Pallet <pallet number> of <total number of pallets>" i.e. Pallet 1 of 2, Pallet 2 of 2. This applies even where supplied on one pallet, Pallet 1 of 1.

Provision shall be provided for the level lifting of the roof by a vehicle mounted crane. Where eye bolts are required they shall be supplied by the Manufacturer who shall demonstrate that they are suitable for lifting at the designated fixing points to the GRP enclosure.

All fittings required to fix the enclosure to a concrete plinth shall be supplied. It shall not be necessary to cast or grout any fixings into the concrete plinth, and supplied fixings shall require only suitably sized holes to be drilled in the plinth.

11.6 Ventilation

Cooling of the enclosed equipment shall be by natural ventilation. Ventilation openings shall be so arranged, or shielded, to provide the same degree of protection specified in Section 11.2. Such openings may make use of wire mesh or similar, provided that it is sufficiently corrosion resistant, arranged as to not collect rain water and of suitable mechanical strength to resist vandalism.

The total net ventilation area is to be a minimum of 0.74m², divided approximately equally between high and low level.

11.7 Fire Behaviour

The enclosure material shall be treated to reduce flammability. Sources of ignition include internal equipment failure, careless handling of propane gas torches and deliberate acts of vandalism.

The resin shall comply with BS 476-7 Class 2 for external and internal fire rating, regarding surface spread of flame.

11.8 Design Life

The enclosure shall be designed to have an expected service life in excess of 30 years. Evidence shall be provided to support expected service life.

11.9 Doors and Locking Arrangements

Doors form an integral part of the enclosure and when closed shall provide the specified degree of protection. They shall be full height and form approximately 80% of the width of the accessible elevation, with no central pillar. They shall open outwards to at least a 90° angle and be provided with a heavy duty stay mechanism for retention in the open position. The design of the stay shall be subject to scrutiny, it shall take account of the load that gusts of strong wind place on the open door and shall be sufficient to hold the door in such conditions, without damage to either the doors or the stays. Open doors, in position as retained by stays, shall not extend more than 1.2m, measured at a 90° angle to the accessible elevation. This may require the use of a folding panel or similar design for models with wide doors.

'The method used to secure the doors in the closed position shall be sufficient to frustrate third party access to the enclosed equipment. It shall be secured with Company supplied padlocks having a body up to 63 mm square with a 10 mm diameter shackle having a clear inside width of 35 mm and an inside length of between 25 mm and 45 mm. The hole provided for the shackle shall be not less than 12 mm diameter.'

Designs which are secured by a single padlock combined with a three point locking system shall be preferred.

11.10 Finish

The external surface of all panels shall be high quality fire retardant grade gel coat to approval, with an agreed gloss or semi-gloss finish. Finish may be planked, ribbed or plain to approval. All surfaces are to be free from snags and protrusions.

The Tenderer shall base pricing on the supply of enclosures in three standard colours. Indicative pricing for special ordering of non-standard colours or special finishes (brick, stone etc.) shall be provided.

All fibreglass resin and gel coat shall be purchased with a certificate of conformity and fully recorded as used in production.

Samples of the proposed texture shall be provided for approval.

11.11 Sustainability Requirements

The Tenderer shall provide evidence at the time of tender that they are certified to the environmental management system BS EN ISO 14001 or comparable environmental management system for the products tendered for as detailed in this specification.

Where available, the tenderer shall provide Environmental Product Declarations aligned to ISO 14025:2006 for significant materials streams and products. The tenderer shall use the UK Government GHG Conversion Factors for Company Reporting under Scope 3 (other indirect) emissions, material use and waste disposal to calculate the embodied carbon dioxide equivalent (CO_{2e}) in kilograms (or tonnes) per tonne of material within the product and packaging, splitting by different material.

To assist SPEN in meeting environmental targets, at the time of tender the Tenderer shall provide the following information:

- Provide a detailed breakdown of the materials used in each item and give evidence how material use has been optimised in each item.
- Provide details of the transportation and packaging arrangements for each item, and commit to optimising these, reducing the amount of packaging and the return of packaging for reuse over the contract period.
- Provide details of the end of life requirements for individual components and component packaging, including any circular economy practices and sustainable resource management. This information shall also be included with the delivered item.
- Provide details on the embodied carbon (in kgCO_{2e} or tonneCO_{2e}), including the amount of energy used to manufacture each item, expressed in kWh, details of what percentage of the energy used is from renewable sources and details of carbon intensity in the country of manufacture, if known.
- Provide accurate environmental data in relation to each item e.g. environmental product declaration.
- Provide evidence of how they have been delivering sustainability and reducing carbon emissions over the last 3 years.

Despite the requirement to optimise transportation and packaging arrangements, the Tenderer shall ensure that each item is suitably packaged and protected to maintain the product and packaging as “fit for service” prior to use. All packaging shall be sufficiently durable giving regard to the function, reasonable use and contents of the packaging.

If the above information requested is not available, the Tenderer shall commit to developing mechanisms to provide this information within the first year of the contract period. If the Tenderer is unable to provide this information within the first year, then the Tenderer shall state the length of time required. Acceptance of the proposed timeline is at the discretion of SPEN. Milestones shall be set before the commencement of the contract award and progress checked through quarterly business review meetings. Tenderers with the mechanisms described in this section already in place shall be preferred

12. QUALITY ASSURANCE

The Tenderer shall operate a fully documented quality assurance system, and shall indicate with their tenders the QA approvals granted. The Tenderer shall submit the following documents with their tender:

1. Overall quality policy statement
2. Copies of all formal quality approvals

3. Quality plans identifying the control stages during manufacture and test
4. Statement on handling and disposal of waste accruing from product manufacture
5. Environmental Policy

13. SCHEDULE 1 – DEPARTURES FROM THIS SPECIFICATION

Section No.	Detail of non-compliance or departures from this specification (continue on separate page if necessary)

14. APPENDIX A – DRAWINGS

14.1 5 x 2.5 x 2.1m Enclosure

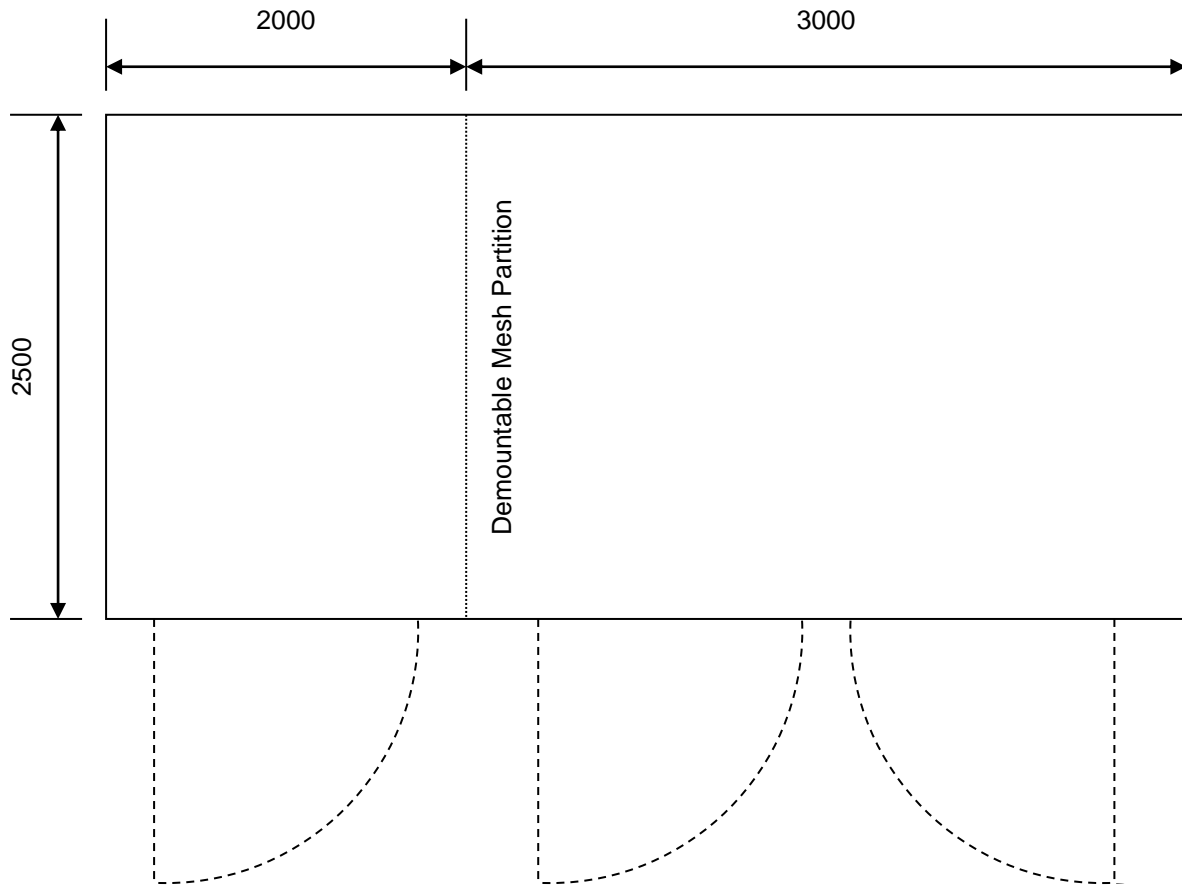


Figure 1 – 5 x 2.5 x 2.1m Enclosure

14.2 6 x 2.5 x 2.1m Enclosure

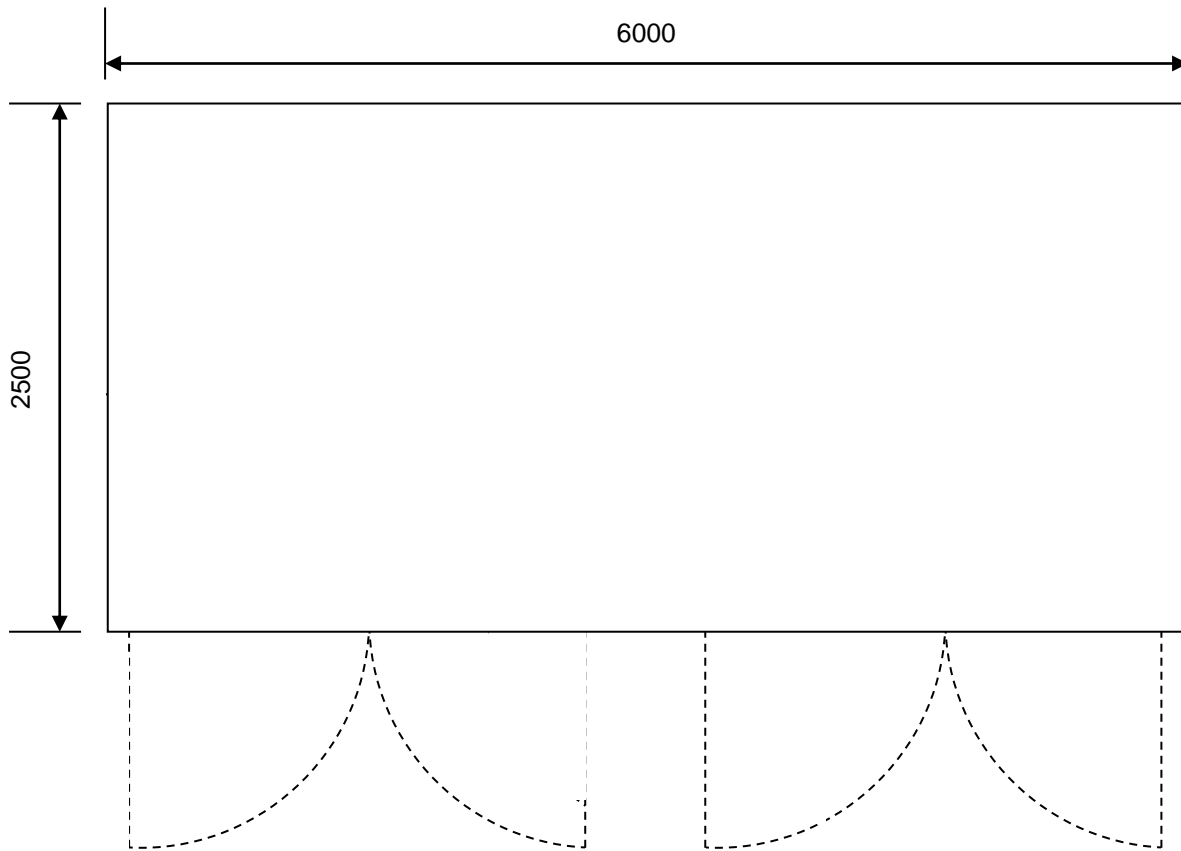


Figure 2 – 6 x 2.5 x 2.1m Enclosure