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DNO Cubicles Operation & Maintenance Manual

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Issue and Revision Record

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2.0	10/09/2019	P Davies	Updates added
3.0	26/03/2021	P Davies	Updates added

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1. Introduction

The Distribution cubicle is manufactured from GRP (Glass Re-enforced Plastic) and is fitted with internal electrical distribution equipment to the Clients requirements.

2. Competencies and Training Requirements

Staff with the responsibility for installation and maintenance of DNO/Distribution Cubicles must hold the required Network Rail licenses.

The training will provide the skills and knowledge needed to identify faulty modules/components and the correct procedures for their replacement. Training for the repair of line replaceable units (modules) is not available. Line replaceable units, where appropriate will be returned to the manufacturer for repair or replaced from spares where repair is not practical.

3. Safety - Isolation and Risk of Electrocutation

DNO/Distribution Cubicles are designed to work with voltages up to (and including) 400VAC and as such there is a danger of electrocution once any of the covers are removed.

All electrical power feeds to the Cubicle MUST be ISOLATED and LOCKED OFF BEFORE removal of any of the enclosure covers.

230, 400, and 650VAC supply voltages are commonly used inside power & signalling cubicles; therefore any personnel working inside these units should be appropriately trained. It should also be noted that the energised equipment are mounted inside a locked insulated enclosure, which also has large caution labels clearly visible from the front and rear.

Personnel working on any electrical equipment should be appropriately trained to work with dangerous voltages and be fully conversant with the power circuitry. All connections are shrouded to prevent accidental contact with personnel (fingers etc.) however these voltage may be exposed when using tools such as screwdrivers etc.

Once Isolation has been carried out, it is essential that a proved* voltage indicator is used to recheck that all electrical equipment is dead prior to any works being undertaken.

* It is recommended to use a proving device with the voltage indicator to check for correct operation both before and after checking that the equipment to be worked upon is dead.

4. General Specification

The Distribution cabinet has been manufactured in accordance with the following specification:

Generic Technical Workscope - DNO -NAT_TW_InfraInv_ENG_EP6248683 Issue 3.0

Each DNO will house equipment based on the particular site requirements. As such a set of drawings will be produced for each DNO detailing general arrangement, backboard layout and wiring schematic.

5. Cubicle Installation

It is recommended to install the cubicle on a precast concrete base, with fixing down and sealing being carried out as per drawing Flange Fixing detail which is included in AppendixA.

The cubicle shall be securely fixed to its permanent base. Appropriate sealing shall be provided between the cubicle and its fixing position. At the cubicle base, methods shall be adopted to prevent vermin and moisture ingress. Adequate facilities for water drainage shall also be provided.

6. GRP Enclosure Construction Details

Single Sided Cubicles

GRP panels to comply with BS476: part 7 class 1 (surface spread of flame) and retention of stability and integrity.

GRP composite panels to comprise: external laminate of two layers of 450gsm chopped strand mat, 18mm wbp exterior plywood and one internal layer of 450gsm chopped strand mat. The interior to be finished in a resin wash /flow coat.

Designed to withstand wind and snow loading to BS6399: part 2. Snow loading on roof is based on 2.5kn/sq metre. Environmental protection is to IP54 (excluding vents)

GRP Cubicle Construction

Walls

GRP / 18mm WBP ply core with encapsulated timber strengtheners. Construction to give a U value of 2.2 W/m² / 0deg C. Corner posts to be solid encapsulated timber.

Roof

Roof constructed from 18mm WBP plywood core and joists encapsulated in GRP. Construction to give a U value of 2.2 W/m² / 0deg C.

Base / Fixing down plates

Internal GRP flange, 100mm wide, minimum 5mm thick, for fixing down with 3mm stainless steel flat bar to cover base flange

Doors

1 no. sets outward opening double encapsulated steel reinforced GRP doors, with heavy duty stainless steel hinges with tamper proof screws and hold open mechanism, to hold door open at both 90° and 180°. Door to be fitted with 3 point locking system with padlockable compression handle. All parts to be stainless steel. Door rebate to be fitted with compression seals with overlapping centre door seal.

1 no. outward opening single encapsulated steel reinforced GRP door, with heavy duty stainless steel hinges with tamper proof screws and hold open mechanism, to hold door open at both 90° and 180°. Door to be fitted with 3 point locking system with padlockable compression handle. All parts to be stainless steel. Door rebate to be fitted with compression seals with overlapping centre door seal.

Ventilation

Two stainless steel ventilation grills fitted to side walls with GRP cowls.

Lifting Points

Two Stainless steel lifting plates (removable)

Backboard Partition

Marine plywood backboard (25mm) treated with two coats of clear gloss polyurethane to both sides and edges.

Colour

External: Grey to 00-A-05 or as clients colour choice
Internal: Off white resin finish.

Double Sided Cubicles

GRP panels to comply with BS476: part 7 class 1 (surface spread of flame) and retention of stability and integrity.

GRP composite panels to comprise: external laminate of two layers of 450gsm chopped strand mat, 18mm wbp exterior plywood and one internal layer of 450gsm chopped strand mat. The interior to be finished in a resin wash / flowcoat.

Designed to withstand wind and snow loading to BS6399: part 2. Snow loading on roof is based on 2.5kn/sq metre. Environmental protection is to IP54 (excluding vents)

CONSTRUCTION

Walls

GRP / 18mm WBP ply core with encapsulated timber strengtheners. Construction to give a U value of 2.2 W/m² / 0deg C. Corner posts to be solid encapsulated timber.

Roof

Roof constructed from 18mm WBP plywood core and joists encapsulated in GRP. Construction to give a U value of 2.2 W/m² / 0deg C.

Base / Fixing down plates

Internal GRP flange, 100mm wide, minimum 5mm thick, for fixing down with 3mm stainless steel flat bar to cover base flange

Partition

Partition constructed from 2 no. 18mm marine ply backboards to form 2 separate units

Doors

2 no. sets outward opening double encapsulated steel reinforced GRP doors, with stainless steel hinges with tamper proof screws and hold open mechanism, to hold doors open at both 90° and 180°. Doors to be fitted with 3 point locking system with padlockable compression handle. All parts to be stainless steel. Door rebate to be fitted with compression seals with overlapping centre door seal.

Ventilation

4 no. stainless steel ventilators to side walls with GRP cowls.

Lifting Points

2 no. stainless steel lifting plates (removable)

Backboard

Marine plywood backboard treated with two coats of clear gloss polyurethane to both sides and edges.

Colour

External: Any colour from BS4800 or RAL ranges. Finish to be semi-mat textured.
Internal: Off white resin finish.

7. Lifting & Finished Weight

The cubicle must only be lifted using the lifting plates provided. These are removable and can be detached once the cubicle is in position. It is recommended that these be stored in a safe place should they be required at a later date.

Enclosure Lifting Plates

Lifting plates are secured to the enclosure as per the typical proposed manufacturing drawing detailed in Appendix A

During transportation these lifting plates are usually loosened off and rotated down to reduce the overall height of the unit. If this has been carried out the lifting plates will need to be repositioned as per the attached drawing and tightened.

Batch testing is conducted on a sample of plates at pre-determined intervals to ensure their continuity of conformity.

- Fabricated Metal Plates 200mm x 50mm x 6mm
- Safe Working Load - 500kgs each

If the combined weight of the equipment and enclosure exceeds the safe working load mentioned above, new lifting plates with a higher safe working load should be purchased and attached to the enclosure.

A lifting plan should be carried out by the contractor who is conducting the lift.

Certified lifting chains should be attached to the lifting plates. It is important to make sure the chains are spread correctly to prevent excessive pressure being put on the plates. A spreader beam may be required to aid with this depending on the width of the unit.

8. Maintenance

Routine and corrective maintenance

The switchgear should be maintained in accordance with the manufacturer's instructions as applicable.

All maintenance should be in accordance with the Wiring Regulations (BS7671).

All electrical power feeds to the DNO/Distribution Cubicle MUST be ISOLATED and LOCKED OFF prior to any work being carried out.

Replacement of Components

The internal components can be replaced with new, on a like-for-like basis as required. For reference, the part numbers for the components used within specific cubicles, will be detailed on the construction drawings for the relevant project.

Annual Procedure

It is recommended that the following work be carried out yearly:

- General visual inspection as to the condition of the enclosure and components within (including wiring).
- Check presence & legibility of all I.D. labelling and warning notices.
- Check all cable connections and crimps are secure and do not show any sign of heat/burning.
- Check that all fuses are present and of the correct size (and voltage rating) as detailed on the electrical schematic diagrams.
- Remove, inspect, and re-insert fuses. Check carrier tightness & for signs of any burning.
- Ensure all fixing nuts, washers, bolt covers etc. are present, correct, and tight.
- Check cables and glands box for damage or evidence of water ingress.
- Give the equipment a general clean and remove any build-up of dust/debris using a brush and vacuum fitted with small nozzle.
- Before being returned to service, it is recommended to carry out a full operational check of the isolation switches.

RCD's need to be tested quarterly as per BS7671

To test the operation of the RCBO after installation, press the test button "T" or Test on the front of the device.

The RCBO should switch off the supply and should then be switched on to restore the supply. If the device does not switch off the supply when the button is pressed indicates either no supply to the RCBO, or a faulty device.

A test for the effectiveness of the RCBO in a protected installation should be carried out periodically as detailed in local regulations and standards, using suitable test equipment.

Megger test;

RCBO must be disconnected before any High Voltage dielectric tests are carried out.

Cleaning

All exterior and surfaces can be washed down/wiped over gently with a damp sponge or cloth.

Due to the dangerous voltages, under no circumstances must excess water be allowed to get inside the cubicle.

9. Recommended Spares

It is recommended that a selection of relevant fuses/mcb's be kept as spare parts.

10. Disposal

All electrical equipment must be disposed in accordance with local authority regulations & the WEEE (Waste Electrical & Electronic Equipment) Regulations. A summary of the WEEE regulations is given below. For further information contact the Environment Agency.

Summary of Waste controls for people who handle WEEE

The storage, transport, treatment and disposal of WEEE is covered by waste legislation. The main requirements are summarised below:

- An operator of a site that accepts WEEE to dismantle or treat for parts or materials will need an appropriate Environmental Permit. Information is available from our website at: www.environment-agency.gov.uk/epr
- An exemption from environmental permitting can be registered with us for sites that store WEEE prior to recovery elsewhere, and a chargeable exemption is available for sites that refurbish WEEE.

Everyone that handles WEEE or other waste, including the waste producer, has a Duty of Care. This aims to look after waste from 'cradle to grave'. A business must:

- store their waste properly to prevent it from harming the environment;
- only pass it to someone authorised to deal with it;
- pass a written description of the waste (Waste Transfer Note or Hazardous Waste Consignment Note) to the waste carrier, this note accompanies the waste and helps others know how to handle the waste.

Waste producers should also check that all wastes leaving their site are taken to a properly authorised site. You can check with the environment agency if you have any doubts. If your waste later caused a problem (e.g. it was illegally dumped) you would need to be able to show that you had taken all reasonable steps to ensure it was properly managed.

11. APPENDIX A

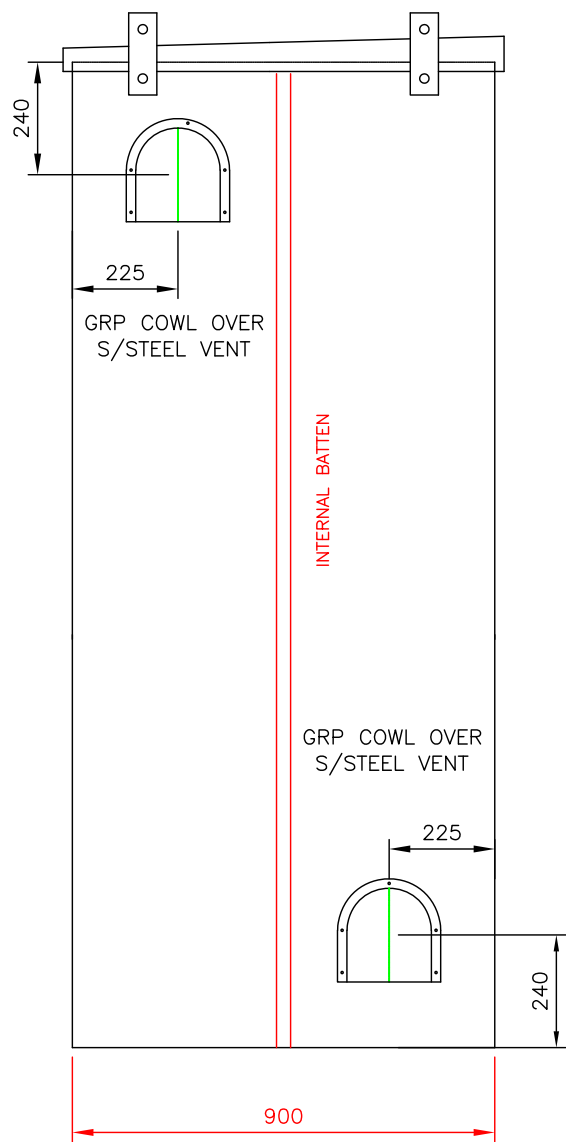
Contents

- **Typical Drawings – Proposed Manufacturing Details**

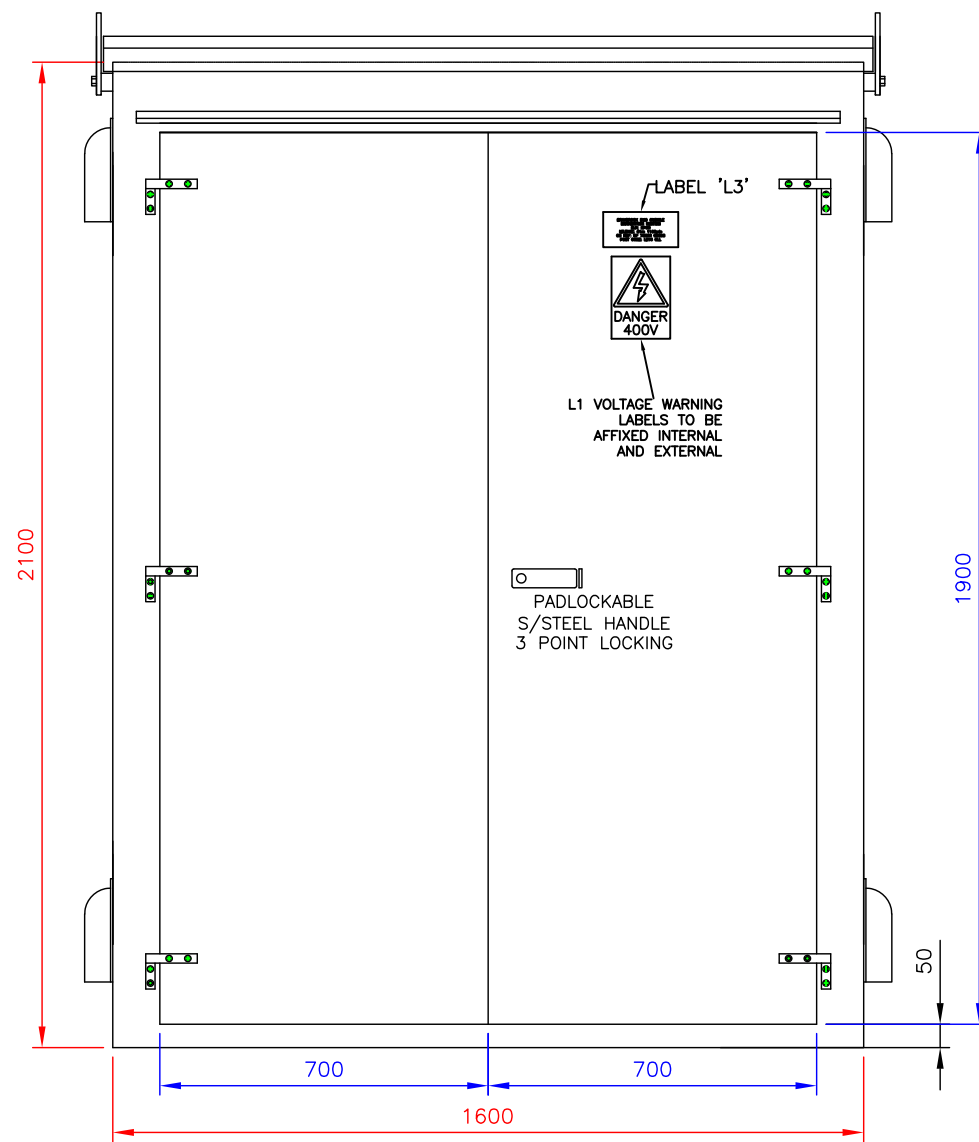
See Drawing

- **Drawings - Network Rail Flange Fixing Detail**

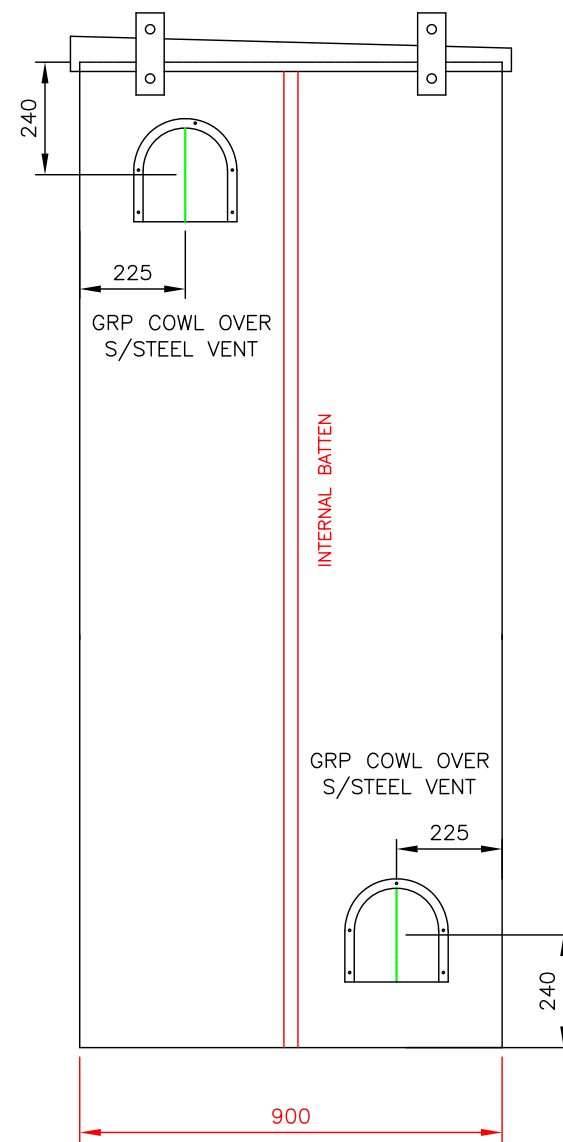
See Drawing



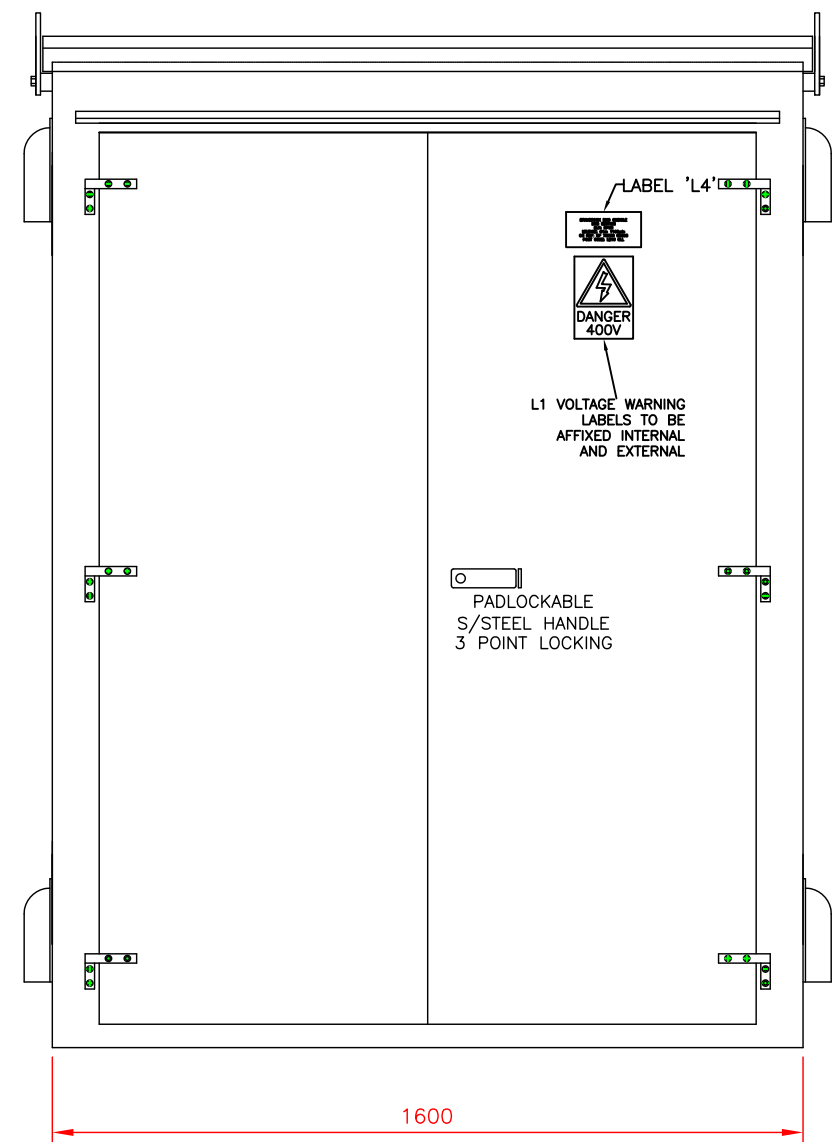
LEFT HAND ELEVATION



FRONT ELEVATION



RIGHT HAND ELEVATION



REAR ELEVATION


TITLE LABEL - L3

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 DISTRIBUTION SECTION
 ELR: ****
 MILEAGE: **m ****yds
 OS REF: ** *****
 POST CODE: **** **

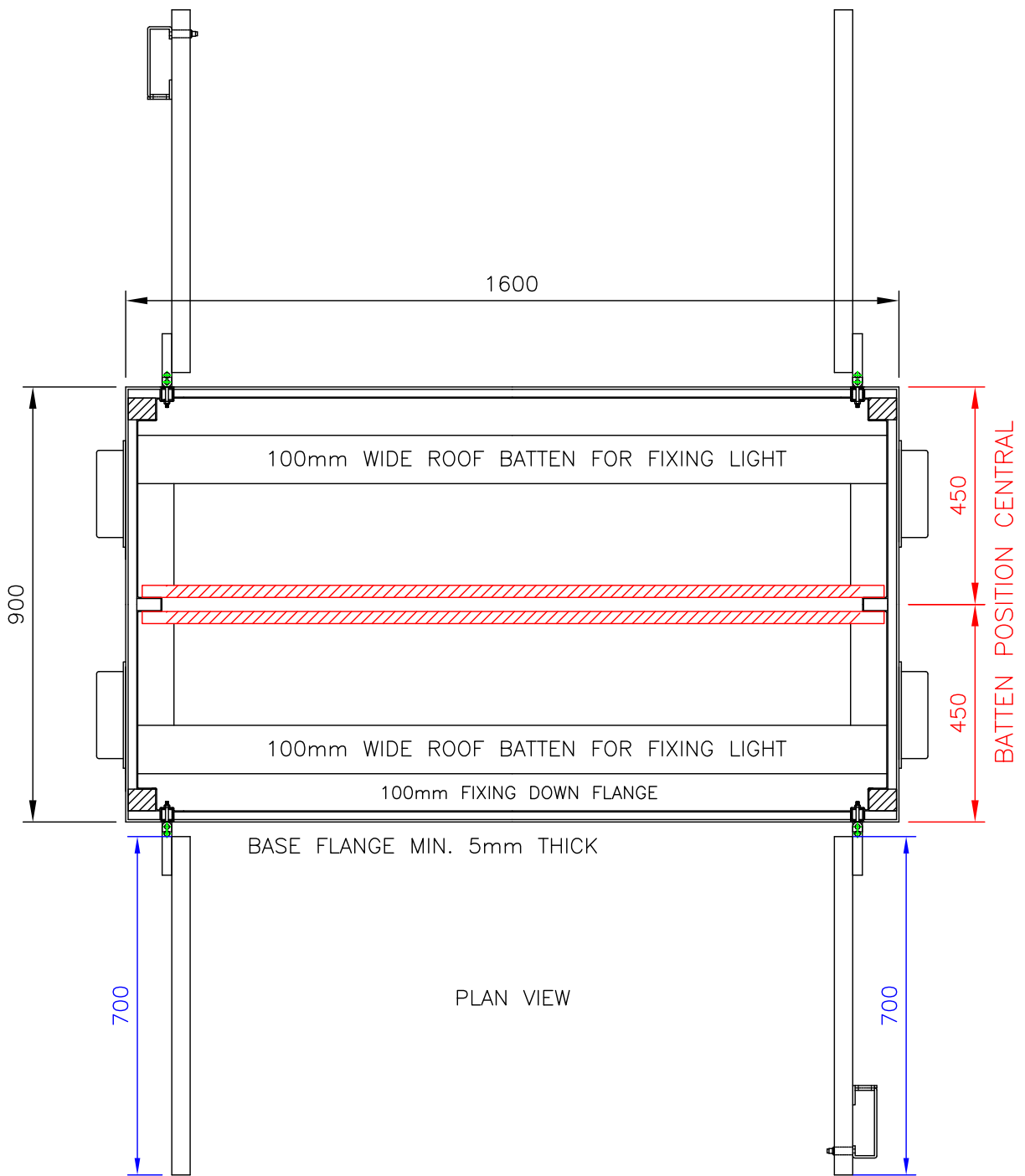
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INFORMATION ONLY

 Henry Williams Ltd - Electrical Projects	PRODUCED	DARLINGTON ENGLAND ON 20090 DWG. No 20090-TYPICAL DOUBLE SIDED DNO-M001
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TYPICAL DOUBLE SIDED GRP DNO CUBICLE ELEVATIONS		ISSUE *
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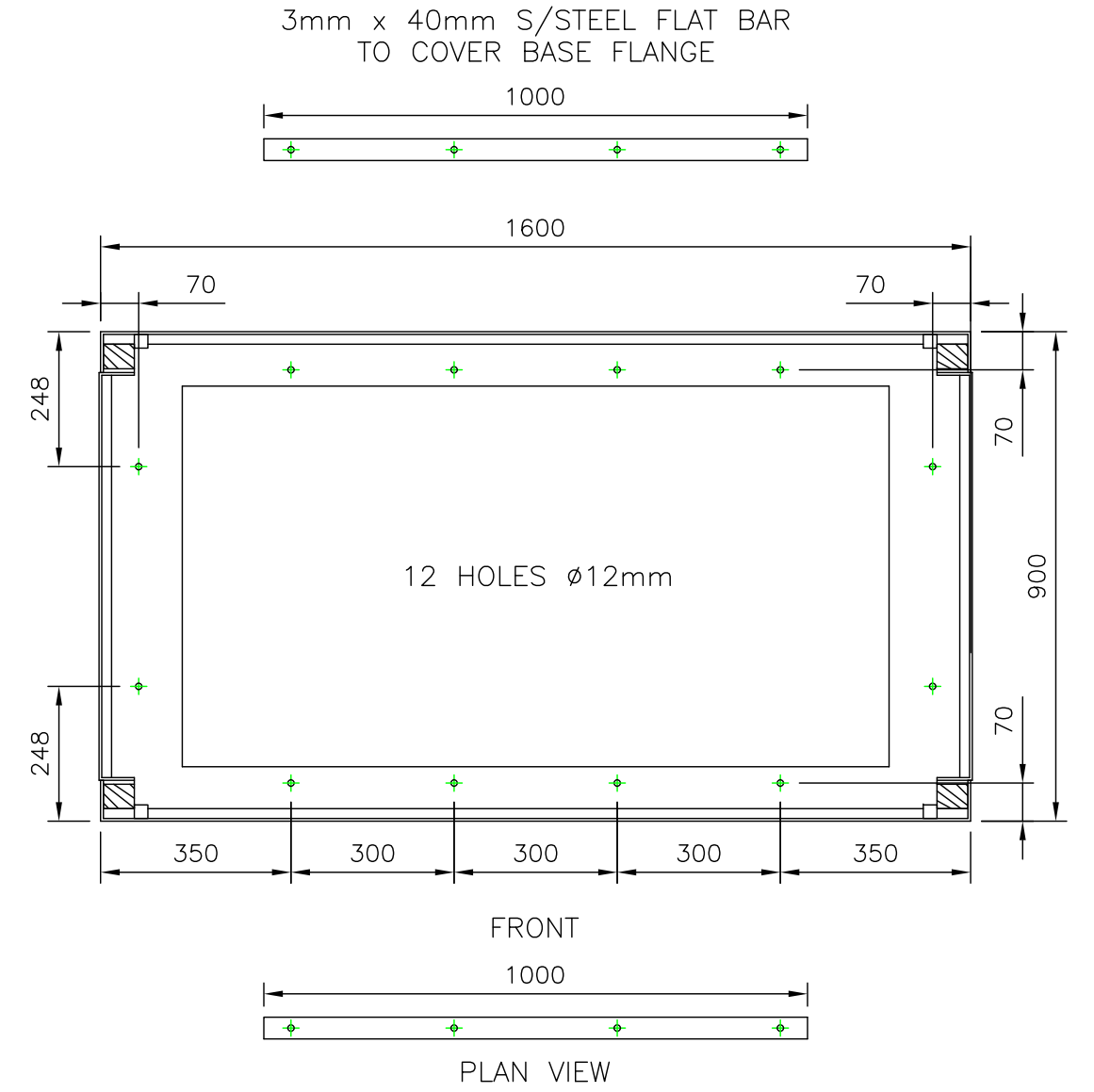
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DOUBLE DOOR SIZE:-
650 Wide x 1900 High Each

DOUBLE DOOR CLEARANCE SIZE:-
1250 Wide x 1850 High

All Dimensions in millimetres

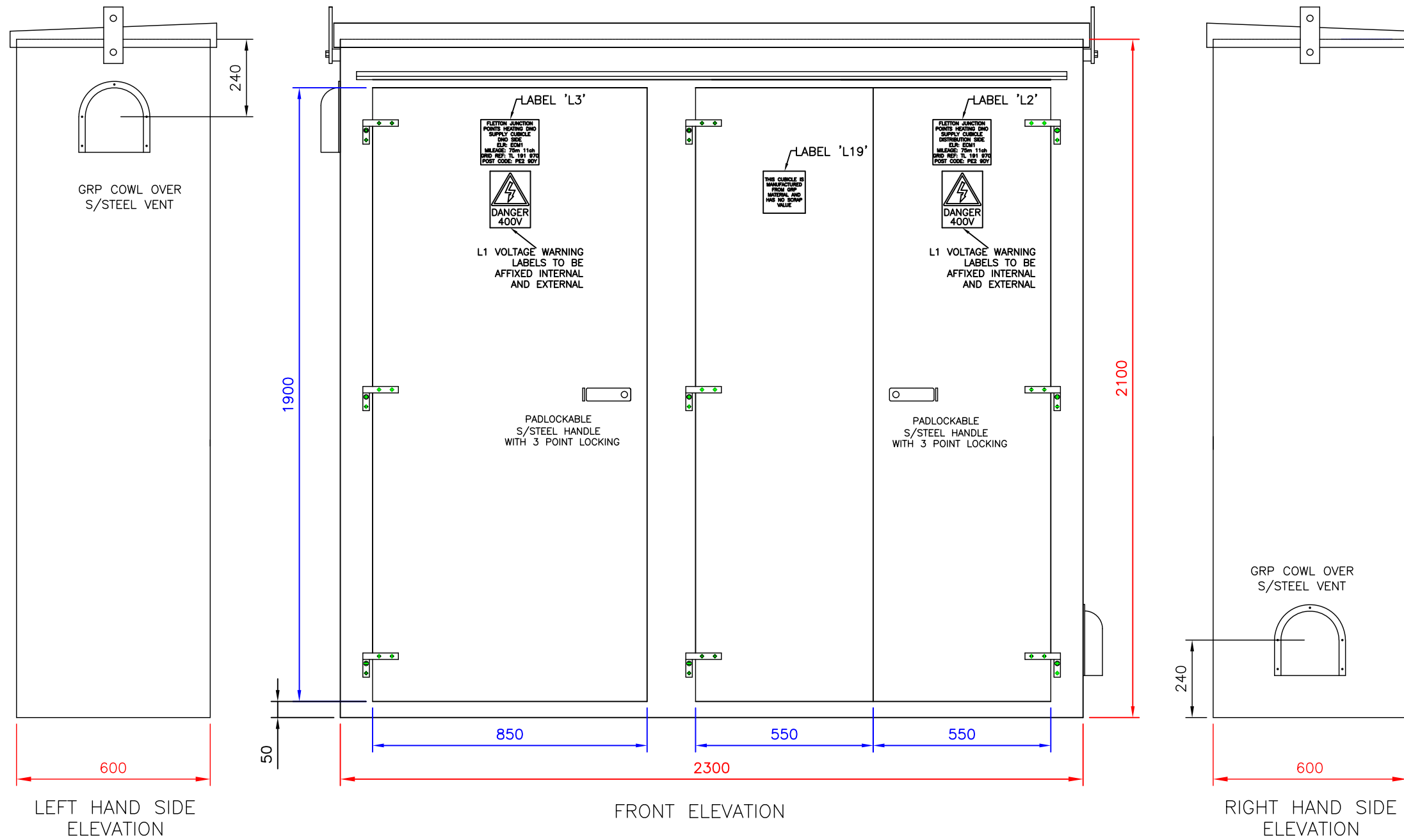


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LEFT HAND SIDE ELEVATION

FRONT ELEVATION

RIGHT HAND SIDE ELEVATION


TITLE LABEL - L3

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 DISTRIBUTION SECTION
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 MILEAGE: **m ****yds
 OS REF: ** *****
 POST CODE: **** **

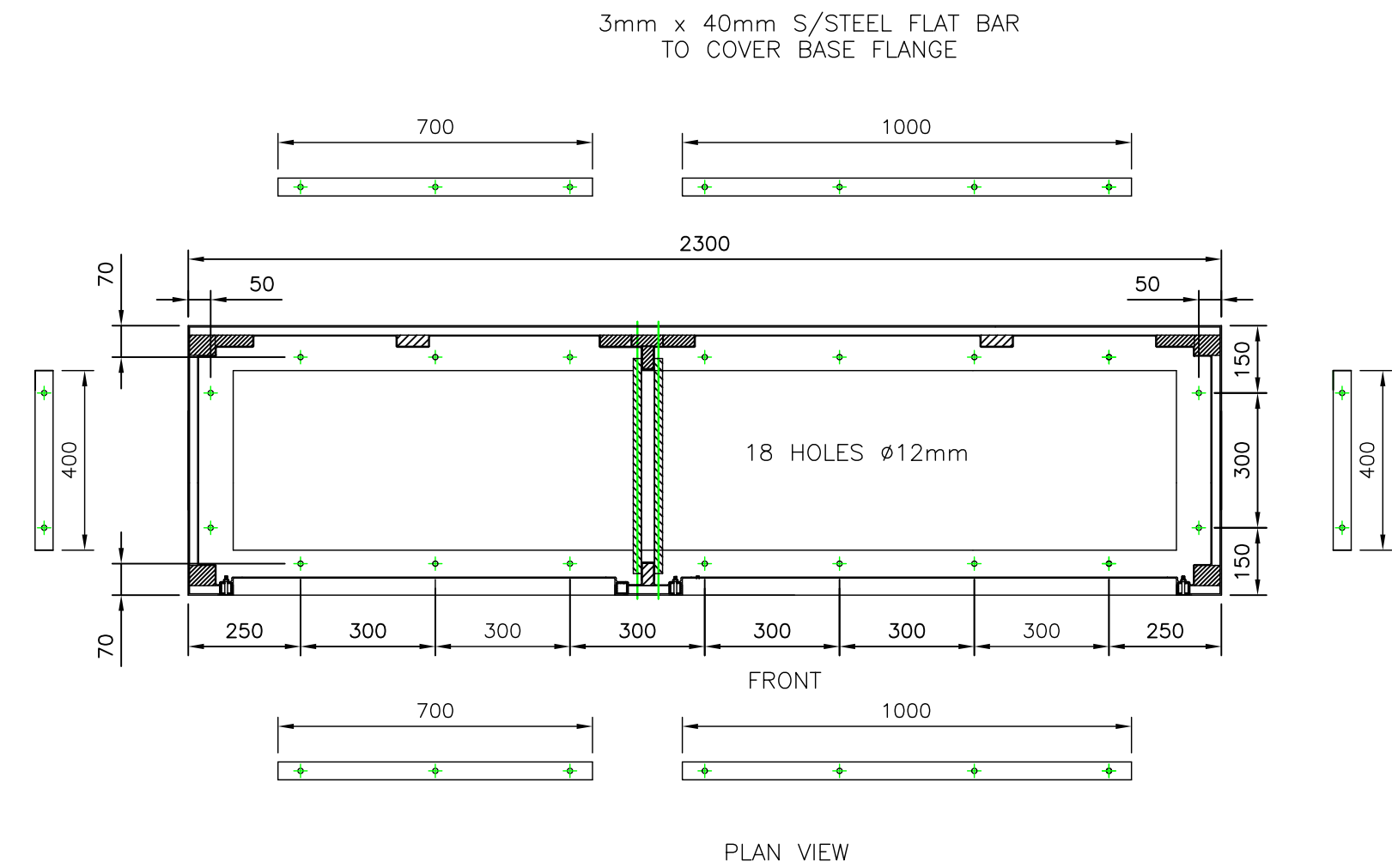
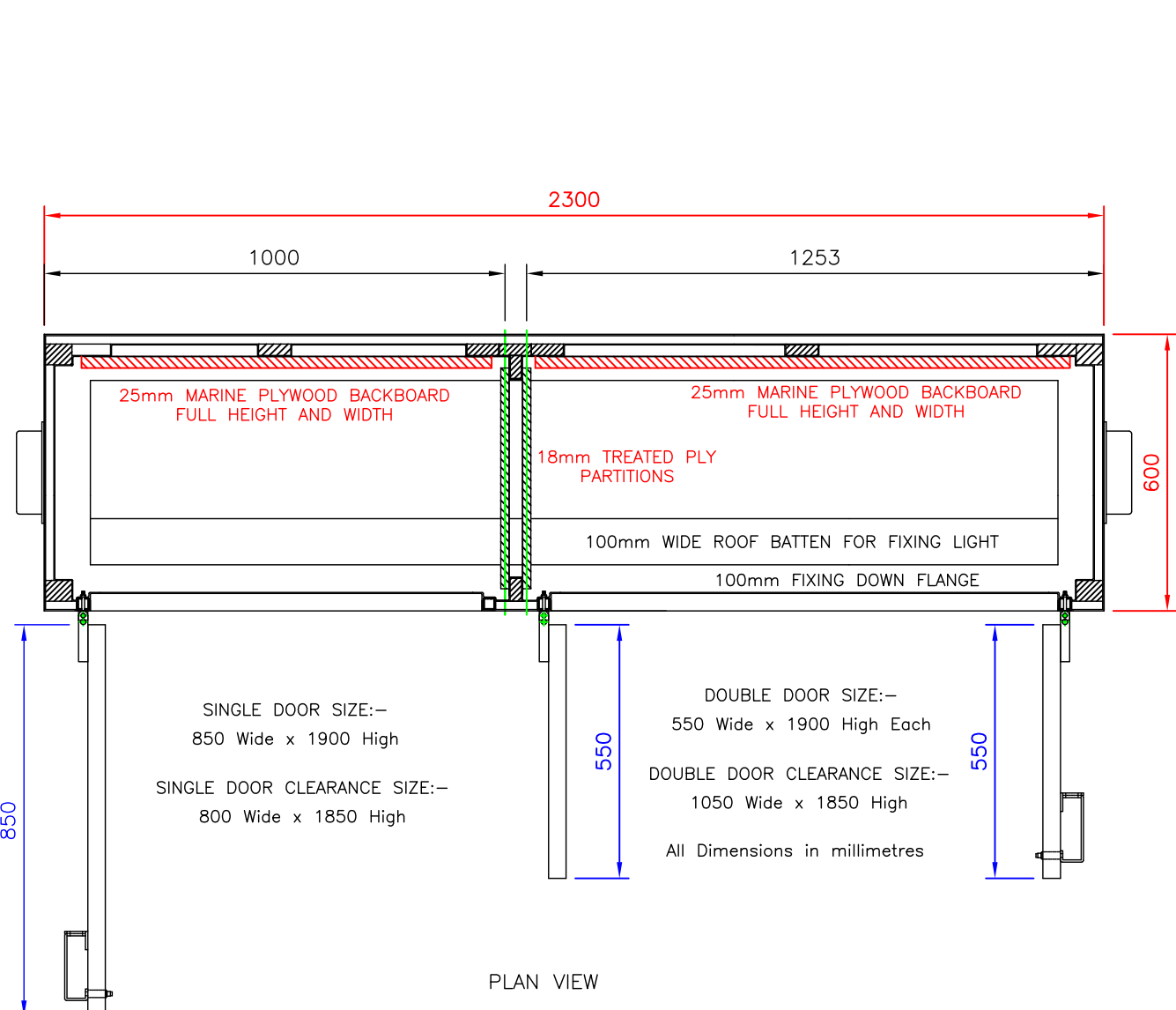
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 DNO SECTION
 ELR: ****
 MILEAGE: **m ****yds
 OS REF: ** *****
 POST CODE: **** **

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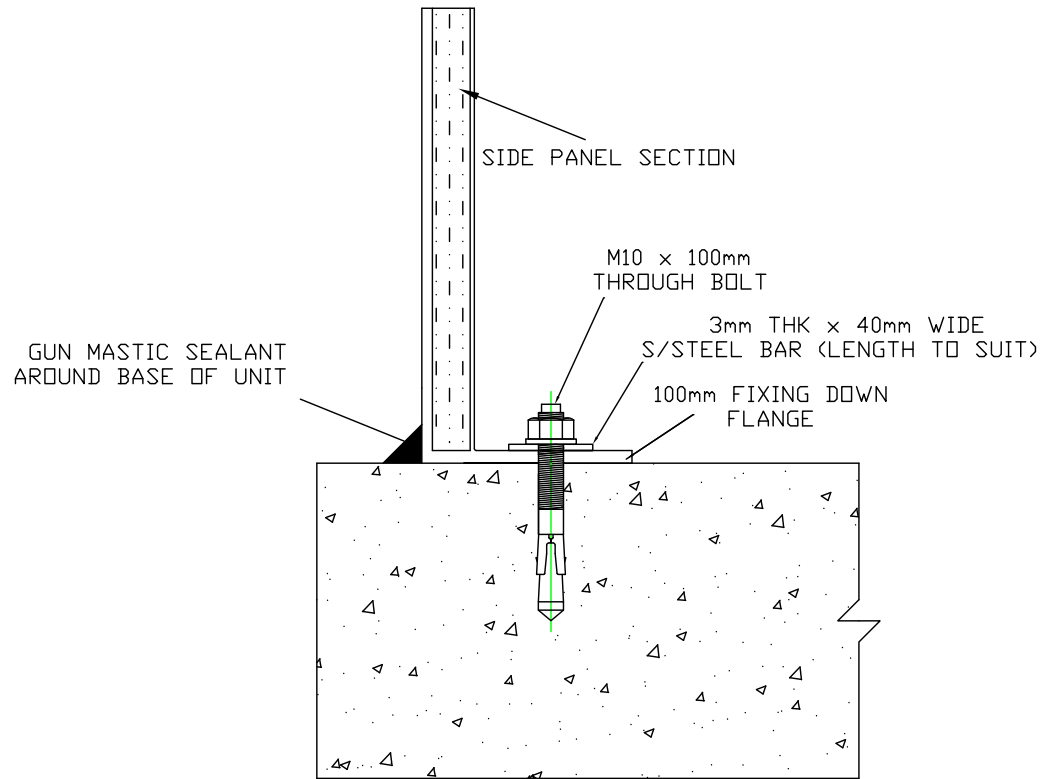
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	ISSUE *

PANEL TO FLAT CONCRETE BASE
 FIXING DOWN DETAILS
 NETWORK RAIL SPECIFICATION



RECOMMENDED CONCRETE BASE :-
 BASE 50mm LARGER ALL ROUND THAN UNIT
 MINIMUM THICKNESS 150mm

00			
REV No.	MODIFICATIONS	DRAWN	DATE

DRAWN	DATE	CLIENT APPROVAL	DATE
R.MCGUINNESS			
TITLE: NETWORK RAIL FLANGE FIXING DETAIL			
DRG No. FPL / FIBAFORM PRODUCTS LTD 001			
MD 02			
FIBAFORM PRODUCTS LTD.			
22 Lansil Industrial Estate, Caton Road, Lancaster, LA1 3PQ. DESIGNERS AND MANUFACTURERS OF GLASSFIBRE PRODUCTS.			