

Standards Alert

StdsA965



Part of Energy Queensland

Subject:	Energex C&I Substation Manual Updates for Indoor LV Connected Customers	Control Ref No:	StdsA965
		Date Issued:	01/07/2026
		Last Reviewed:	01/07/2026
		Supersedes:	N/A
		Expiry Date:	31/12/2026
Associated Policy / Procedure / Manual		Energex C&I Substation Manual	
Originating Dept:	☐ Overhead ☒ Line Standards ☒ Substations ☐ Integrated Product Standards ☐ Telecommunications SCADA ☐ Connection Standards ☐ Earthing & Protection ☐ Isolated Networks ☐ Other		
Target Audience	☒ Overhead ☒ Underground☐ Substations ☒ Secondary Systems ☒ Customer group ☒ Design ☐ Telecommunications SCADA ☒ Public Lighting ☐ Generation		
Target Region	☐ EQL All Regions ☐ Northern /Southern ☒ SouthEast		
Publish Location	☒ Asset Standards SharePoint ☒ Field Force Automation ☒ SWP On-line		

1 Amendment Record

Version	Date	Author	Amendments
Initial	30/06/2026	G. Caldwell	Initial Issue

2 Objective

The purpose of this Standards Alert is to assist with interpretation of the Energex Commercial & Industrial Substation Manual V12 for indoor low voltage connected customers and other general requirements. Updates included are layouts for the most common two transformer arrangements, update to ceiling heights, ventilation requirements, earthing in areas with hydrostatic pressure and a restriction of equipment access via street frontage. Clarification to arc flash study requirements and references to checklists for drawing submission, room handover and commissioning are included.

Recently accepted project layouts that encompass the majority of connections are shown across three scenarios. These layouts can be used as suitable options and are compliant with the Energex C&I Manual V12. A standard drawing template has been used with variations to accommodate the three connection scenarios.

3 Scope

Only Indoor LV connected customer options are shown, another Standards Alert with HV connected customer layouts will follow in the near future. Arc flash studies are not required on these LV layouts using standard Energex equipment. While this Standards Alert includes the most common two transformer options, the layouts can be scaled up to four transformer options.

4 LV Connected Layouts

Standard drawings are included to map out the most common connection options shown in Appendix A. Additional considerations may be required for upper/elevated substations and basements.

11040-A4-13-13-6-A - LV Connected Customer Non-Relay Operated HV Switchgear – 2 Tx Configuration

Equipment in room includes:

- ABB Safelink2, 2 x 1,500kVA Tx (Dry Types), 1 x LV board, 1 x LV Isolator

11040-A4-13-13-7-A - LV Connected Customer Non-Relay with Provision for Future Relay Operated HV Switchgear - 2 Tx Configuration

Equipment in room includes:

- ABB Safelink2, 2 x 1,500kVA Tx (Dry Types), 1 x LV board, 1 x LV Isolator, (future SafePlus, auxiliary supplies, battery ventilation, comms & security equipment and 1m VT exclusion zone).

11040-A4-13-13-8-A - LV Connected Customer with Relay Operated HV Switchgear – 2 Tx Configuration

Equipment room includes:

- ABB Safeplus, 2 x 1,500kVA Tx (Dry Types), 1 x LV board, 1 x LV Isolator, auxiliary supplies, battery ventilation, comms & security equipment and 1m VT exclusion zone.

5 Minimum Ceiling Height for LV Connected Customers

The minimum ceiling height for LV connected customers with bottom entry HV switchgear is 3,200mm.

Safelink2 and SafePlus HV switchgear are bottom entry only.

6 Battery Ventilation Update

Where future relay provision (11040-A4-13-13-7-A) is required and therefore allocation for future natural or mechanical battery ventilation, the room shall be designed to incorporate the battery ventilation penetration accordingly. Provision for 200mm Ø pipework with a vandal proof opening shall be positioned a height of minimum 3m above any area where pedestrian traffic can be anticipated. This height may be reduced if not practicable as per Energex C&I Manual V12.

7 Earthing in Substations with Hydrostatic Pressure

In substations with hydrostatic pressure issues, alternative earthing system proposals such as bonding to building foundations, or under slab earthing are required to be submitted to Energex for approval, and at minimum will require an RPEQ certified earthing study.

8 Restriction of Street Frontage Equipment Access

Equipment landing slabs shall not be located in the road reserve. Provision for the landing slab in front of the equipment doors shall be located in a suitable loading zone not located in the road reserve.

9 Arc Flash Studies

Arc flash studies are not required on the layouts shown in Appendix A where standard Energex equipment is used.

10 Drawing Submission, Room Handover and Commissioning Checklists

To facilitate consistency of EQL requirements, drawing acceptance and audit outcomes, the following checklists can be used as a complement to Energex C&I Manual V12.

Draft Drawing Submission Checklist for Customer Substations – 3069818 (Form 1328) V2, intended for use with 00293 – Energex C&I Manual V12. This version has been updated which was previously aligned with V11 of the manual and is included and watermarked for reference/comparison. See Appendix B.

[Commercial and Industrial Substation Construction Handover Checklist - 3069786](#) is a published document and aligns with Energex C&I Manual V12.

11 Applicability of Manuals

Aspects of the Energex C&I V12 may be applicable to Ergon Energy Network on a case by case basis. Seek advice from Asset Standards where needed.

12 Update to Manuals

An EQL Commercial & Industrial Substation manual is under development which will combine Ergon Energy and Energex requirements. The layouts in this manual will be introduced into a future EQL manual.

13 Further Information

For further information, please contact:

Greg Caldwell email (greg.caldwell@energyq.com.au)

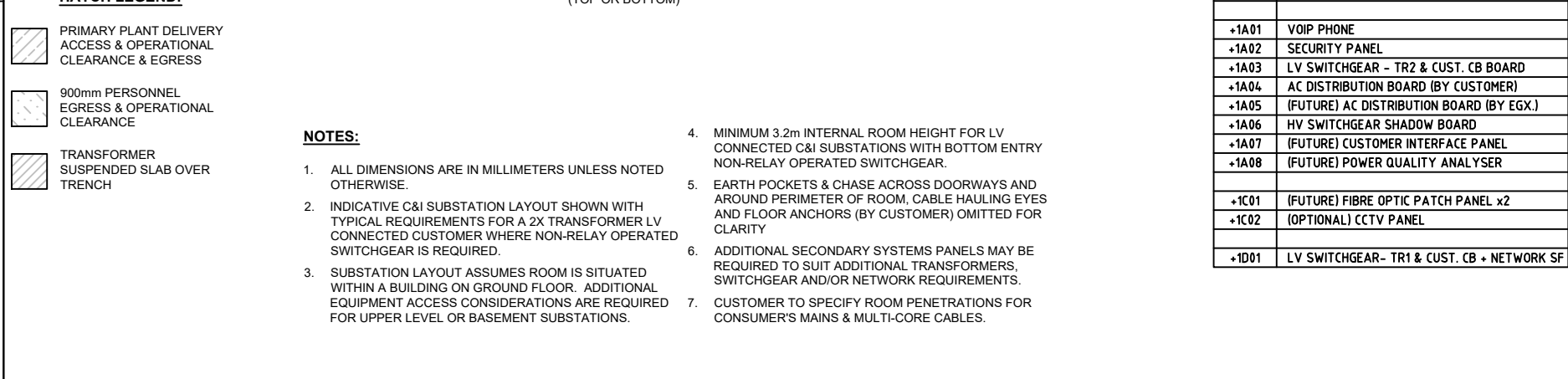
Georgin Raju email (georgin.raju@energyq.com.au)

Appendix A

11040-A4-13-13-6-A - LV Connected Customer Non-Relay Operated HV Switchgear
– 2 Tx Configuration

11040-A4-13-13-7-A - LV Connected Customer Non-Relay with Provision for Future
Relay Operated HV Switchgear - 2 Tx Configuration

11040-A4-13-13-8-A - LV Connected Customer with Relay Operated HV Switchgear
– 2 Tx Configuration



EQUIPMENT SCHEDULE	
LOCATION	DESCRIPTION
+RM1	HV SWITCHGEAR - ABB SAFELINK2 CFCF
+TR1	11kV/LV 1.5MVA DRY TYPE TRANSFORMER
+TR2	11kV/LV 1.5MVA DRY TYPE TRANSFORMER
+1A01	VOIP PHONE
+1A02	SECURITY PANEL
+1A03	LV SWITCHGEAR - TR2 & CUST. CB BOARD
+1A04	AC DISTRIBUTION BOARD (BY CUSTOMER)
+1A05	(FUTURE) AC DISTRIBUTION BOARD (BY EGX.)
+1A06	HV SWITCHGEAR SHADOW BOARD
+1A07	(FUTURE) CUSTOMER INTERFACE PANEL
+1A08	(FUTURE) POWER QUALITY ANALYSER
+1C01	(FUTURE) FIBRE OPTIC PATCH PANEL x2
+1C02	(OPTIONAL) CCTV PANEL
+1D01	LV SWITCHGEAR- TR1 & CUST. CB + NETWORK SF

ORIGINAL ISSUE

EQUIPMENT ACCESS DOORS
(Min 2500mm (w) x 3100mm (h) CLEAR OPENING)

EQUIPMENT & PERSONNEL DOOR
(2500mm (w) x 3100mm (h) DOORS TO ALLOW FUTURE EQUIPMENT DELIVERY WITH RMU IN SERVICE)

PERSONNEL EGRESS PATH HV SWITCHING

PERSONNEL EGRESS PATH LV SWITCHING

1500KVA DRY TYPE

LV

HV

ABB SAFELINK2 RMU +RM1

FUTURE VT CHAMBER

FUTURE ABB SAFERPLUS TYPE VFFV-M +RM2

ARC FLASH EXCLUSION ZONE

TR1 LV BOARD

TR2 LV BOARD +1A03

+1D01

+1A01

+1A01:1

+1A02

+1A04

+1A05

+1A06

+1A07

+1A08

+1A09

+1A10

+1A11

+1A12

1200mm PERSONNEL & EQUIPMENT DOORWAY

NOTE: 1200mm DOOR IS REQUIRED WHERE

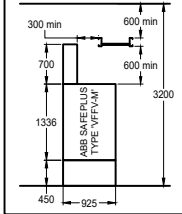
VENTILATION DUCT DROPPER
450mm MAX DEPTH FOR ANY STEEL WORK PROTRUSION INTO ROOM.
CLEARANCE BETWEEN LV BOARD

100mm MINIMUM SEPARATION BETWEEN AUXILIARY PANELS

SHADOW BOARD & CUST. INTERFACE PANEL
TO BE LOCATED ON WALL IN VICINITY OF HV SWITCHGEAR

CONDUIT ENTRY INTO
SUBSTATION TRENCH

**TYPICAL SECTION:
HV SWITCHGEAR &
MULTICORE CABLE
TRAY CLEARANCES**



TR2 LV BOARD
1550mm x 675mm BOARD OVER
1445mm x 504mm TRENCH
INCOMING CB (BOTTOM) &
OUTGOING CUST. CB
(TOP OR BOTTOM)

VENTILATION DUCT DROPPER
450mm MAX DEPTH FOR ANY
STEEL WORK PROTRUSION INTO
ROOM.
CLEARANCE BETWEEN LV BOARD
& VENT DROPPER IS CONSIDERED
INACCESSIBLE.

SHADOW BOARD & CUST.
INTERFACE PANEL
TO BE LOCATED ON
WALL IN VICINITY OF
HV SWITCHGEAR

EQUIPMENT SCHEDULE

LOCATION	DESCRIPTION
+RM1	HV SWITCHGEAR – ABB SAFELINK2 CFCF
+RM2	(FUTURE) HV SWITCHGEAR – ABB SAFEPLUS
+TR1	11kV/LV 1.5MVA DRY TYPE TRANSFORMER
+TR2	11kV/LV 1.5MVA DRY TYPE TRANSFORMER
+1A01	PLAN DESK
+1A01:1	VOIP PHONE
+1A02	SECURITY PANEL
+1A03	LV SWITCHGEAR – TR2 & CUST. CB BOARD
+1A04	AC DISTRIBUTION BOARD (BY CUSTOMER)
+1A05	(FUTURE) PROTECTION PANEL
+1A06	(OPTIONAL) CCTV PANEL
+1A07	(FUTURE) COMMUNICATIONS PANEL
+1A08	(FUTURE) FIBRE OPTIC PATCH PANEL x2
+1A09	(FUTURE) AC DISTRIBUTION BOARD (BY EGX.)
+1A10	HV SWITCHGEAR SHADOW BOARD
+1A11	(FUTURE) CUSTOMER INTERFACE PANEL
+1A12	(FUTURE) POWER QUALITY ANALYSER
+1B01	(FUTURE) 48V DC BATTERY CHARGER
+1B01:1	(FUTURE) 63A AC ISOLATOR
+1B02	(FUTURE) 48V DC DISTRIBUTION BOARD
+1B03	(FUTURE) 48V DC BATTERY BANK ISOLATOR x2
+1B04	(FUTURE) 48V DC BATT. (EXTERNALLY VENTED)
+1D01	LV SWITCHGEAR– TR1 & CUST. CB + NETWORK SF

HATCH LEGEND:

-  PRIMARY PLANT DELIVERY
ACCESS & OPERATIONAL
CLEARANCE & EGRESS
-  900mm PERSONNEL
EGRESS & OPERATIONAL
CLEARANCE
-  TRANSFORMER
SUSPENDED SLAB OVER
TRENCH

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.
2. INDICATIVE C&I SUBSTATION LAYOUT SHOWN WITH TYPICAL REQUIREMENTS FOR A 2X TRANSFORMER LV CONNECTED CUSTOMER WHERE FUTURE RELAY OPERATED SWITCHGEAR IS REQUIRED.
3. SUBSTATION LAYOUT ASSUMES ROOM IS SITUATED WITHIN A BUILDING ON GROUND FLOOR. ADDITIONAL EQUIPMENT ACCESS CONSIDERATIONS ARE REQUIRED FOR UPPER LEVEL OR BASEMENT SUBSTATIONS.
4. MINIMUM 3.2m INTERNAL ROOM HEIGHT FOR LV CONNECTED C&I SUBSTATIONS WITH BOTTOM ENTRY SWITCHGEAR. ROOM HEIGHT ASSUMES MULTICORE CABLE TRAY CAN BE MOUNTED 600mm FROM CEILING AND MAINTAIN 600mm CLEARANCES TO REAR OF HV SWITCHGEAR. CEILING HEIGHT MAY NEED TO BE RAISED IF NATURAL AIR OR HYDROGEN VENTILATION DUCTING INTERFERES WITH MULTICORE CABLE TRAY.
5. PERIMETER OF ROOM, CABLE HAULING EYES AND FLOOR ANCHORS (BY CUSTOMER) OMITTED FOR CLARITY
6. EQUIPMENT EARTH STRAP (BY ENERGEX) OMITTED FOR CLARITY
7. ADDITIONAL SECONDARY SYSTEMS PANELS MAY BE REQUIRED TO SUIT ADDITIONAL TRANSFORMERS, SWITCHGEAR AND/OR NETWORK REQUIREMENTS.
8. CUSTOMER TO SPECIFY ROOM PENETRATIONS FOR CONSUMER'S MAINS & MULTI-CORE CABLES.
9. BATTERY ENCLOSURE TO BE VENTED INTO OUTSIDE ATMOSPHERE AS PER AS3011.2 2019 & AS2676.2 2020 REQUIREMENTS. CUSTOMER TO DESIGN AND INSTALL BATTERY VENTING SYSTEM.
10. MINIMUM 900mm CLEARANCE TO ONE SIDE OF THE BATTERY CHARGER REQUIRED FOR MAINTENANCE. MINIMUM 350mm CLEARANCE TO EACH SIDE OF THE BATTERY BANK REQUIRED FOR CABLE TRAY & VENT DUCTING.

 **energex**

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NOT TO SCALE
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30.06.2026
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CAD

Indoor Substation Typical Layout - Minimum Dimensions LV Connected Customer Non-Relay with Provision for Future Relay Operated HV Switchgear - 2 Transformer Configuration				
	SET	SUB	SH	REV
11040-A4	13	13	7	A

A

ORIGINAL ISSUE

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SCALE NOT TO SCALE

APP'D G.CALDWELL

DATE 30.06.2026

REC'D

CKD C.BASSO

DRN T.BORG

CAD

Indoor Substation

Typical Layout - Minimum Dimensions

LV Connected Customer

Relay Operated HV Switchgear

2 Transformer Configuration

11040-A4

SECT 13

SUB 13

SHT 8

REV A

2500mm WIDE EQUIPMENT ACCESS ZONE WITHIN PRIVATE PROPERTY WITH MIN 5m OVERHEAD CLEARANCE & SUITABLE FOR HEAVY VEHICLES. REMOVABLE BOLLARDS REQUIRED IF ACCESS ZONE IS PART OF A LOADING DOCK. ACCESS ZONE SHALL NOT FORM PART OF A DRIVEWAY OR THOROUGHFARE.

EQUIPMENT ACCESS DOORS (Min 2500mm (w) x 3100mm (h) CLEAR OPENING)

100mm MINIMUM SEPARATION BETWEEN AUXILIARY PANELS

NOTE: CCTV PANEL ONLY REQUIRED FOR HIGH SECURITY CUSTOMER SITES

ALL 48V DC AUX. PANELS & EQUIPMENT SHALL BE LOCATED AS CLOSE AS PRACTICAL. (battery hydrogen ventilation ducting omitted for clarity)

CONDUIT ENTRY INTO SUBSTATION TRENCH

TR1 LV BOARD
2700mm x 675mm BOARD OVER 2595mm x 504mm TRENCH INCOMING CB (BOTTOM), OUTGOING ENERGEX NETWORK SF (BOTTOM) & OUTGOING CUST. CB (TOP OR BOTTOM)

TR2 LV BOARD
1550mm x 675mm BOARD OVER 1445mm x 504mm TRENCH INCOMING CB (BOTTOM) & OUTGOING CUST. CB (TOP OR BOTTOM)

TYPICAL SECTION: HV SWITCHGEAR & MULTICORE CABLE TRAY CLEARANCES

NOTE: 1200mm DOOR IS REQUIRED WHERE EQUIPMENT REPLACEMENT WOULD CROSS A TRENCH

VENTILATION DUCT DROPPER 450mm MAX DEPTH FOR ANY STEEL WORK PROTRUSION INTO ROOM. CLEARANCE BETWEEN LV BOARD & VENT DROPPER IS CONSIDERED INACCESSIBLE.

SHADOW BOARD & CUST. INTERFACE PANEL TO BE LOCATED ON WALL IN VICINITY OF HV SWITCHGEAR

5. EARTH POCKETS & CHASE ACROSS DOORWAYS, CABLE HAULING EYES AND FLOOR ANCHORS (BY CUSTOMER) OMITTED FOR CLARITY

6. EQUIPMENT EARTH STRAP (BY ENERGEX) OMITTED FOR CLARITY

7. ADDITIONAL SECONDARY SYSTEMS PANELS MAY BE REQUIRED TO SUIT ADDITIONAL TRANSFORMERS, SWITCHGEAR AND/OR NETWORK REQUIREMENTS.

8. CUSTOMER TO SPECIFY ROOM PENETRATIONS FOR CONSUMER'S MAINS & MULTI-CORE CABLES.

9. BATTERY ENCLOSURE TO BE VENTED INTO OUTSIDE ATMOSPHERE AS PER AS3011.2 2019 & AS2676.2 2020 REQUIREMENTS. CUSTOMER TO DESIGN AND INSTALL BATTERY VENTING SYSTEM.

10. MINIMUM 900mm CLEARANCE TO ONE SIDE OF THE BATTERY CHARGER REQUIRED FOR MAINTENANCE. MINIMUM 350mm CLEARANCE TO EACH SIDE OF THE BATTERY BANK REQUIRED FOR CABLE TRAY & VENT DUCTING.

HATCH LEGEND:

- PRIMARY PLANT DELIVERY ACCESS & OPERATIONAL CLEARANCE & EGRESS
- 900mm PERSONNEL EGRESS & OPERATIONAL CLEARANCE
- TRANSFORMER SUSPENDED SLAB OVER TRENCH

NOTES:

- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.
- INDICATIVE C&I SUBSTATION LAYOUT SHOWN WITH TYPICAL REQUIREMENTS FOR A 2X TRANSFORMER LV CONNECTED CUSTOMER WHERE RELAY OPERATED SWITCHGEAR IS REQUIRED.
- SUBSTATION LAYOUT ASSUMES ROOM IS SITUATED WITHIN A BUILDING ON GROUND FLOOR. ADDITIONAL EQUIPMENT ACCESS CONSIDERATIONS ARE REQUIRED FOR UPPER LEVEL OR BASEMENT SUBSTATIONS.
- MINIMUM 3.2m INTERNAL ROOM HEIGHT FOR LV CONNECTED C&I SUBSTATIONS WITH BOTTOM ENTRY SWITCHGEAR. ROOM HEIGHT ASSUMES MULTICORE CABLE TRAY CAN BE MOUNTED 600mm FROM CEILING AND MAINTAIN 600mm CLEARANCES TO REAR OF HV SWITCHGEAR. CEILING HEIGHT MAY NEED TO BE RAISED IF NATURAL AIR OR HYDROGEN VENTILATION DUCTING INTERFERES WITH MULTICORE CABLE TRAY.

EQUIPMENT SCHEDULE

LOCATION	DESCRIPTION
+RM1	HV SWITCHGEAR - ABB SAFEPLUS VFFV-M
+TR1	11kV/LV 1.5MVA DRY TYPE TRANSFORMER
+TR2	11kV/LV 1.5MVA DRY TYPE TRANSFORMER
+1A01	PLAN DESK
+1A01:1	VOIP PHONE
+1A02	SECURITY PANEL
+1A03	LV SWITCHGEAR - TR2 & CUST. CB BOARD
+1A04	AC DISTRIBUTION BOARD (BY CUSTOMER)
+1A05	(FUTURE) AC DISTRIBUTION BOARD (BY EGX.)
+1A06	HV SWITCHGEAR SHADOW BOARD
+1A07	CUSTOMER INTERFACE PANEL
+1A08	(FUTURE) PROTECTION PANEL
+1A09	(FUTURE) POWER QUALITY ANALYSER
+1B01	48V DC BATTERY CHARGER
+1B01:1	63A AC ISOLATOR
+1B02	48V DC DISTRIBUTION BOARD
+1B03	48V DC BATTERY BANK ISOLATOR x2
+1B04	48V DC BATTERY RACK (EXTERNALLY VENTED)
+1C01	FIBRE OPTIC PATCH PANEL x2
+1C02	(FUTURE) COMMUNICATIONS PANEL
+1C03	(OPTIONAL) CCTV PANEL
+1D01	LV SWITCHGEAR- TR1 & CUST. CB + NETWORK SF

Appendix B - Customer Drawing Submission Checklist

Drawing Submission Checklist for Customer Substations

Energex Manual 00293 - Commercial and Industrial Substation Manual - Version 12

This checklist is to be used in conjunction with Energex Manual 00293 and does not replace or supersede the requirements of that manual.

Energex:		Customer:	
Work Request:	WR123456	Customer Name:	The Big Electron
Project:	C0123456	Location:	123 Main Street, Electricity City
Project Name:	SSAZT Amazing Towers	Consultant:	Subs 'r' us
Representative:	A. Sponsor	Date:	1/01/1970

Yes No N/A	Item ID	Requirement
A. Certifications & Submissions		
☐ ☐ ☐	A-01	Substation finished floor level is ≥ 75 mm above the Interim Residential Flood Level (IRFL)
☐ ☐ ☐	A-02	Fire detection and protection system installed and certified prior to energisation
☐ ☐ ☐	A-03	Single Line Diagram (SLD) for consumer's mains and main switchboard provided
☐ ☐ ☐	A-04	Mechanical ventilation design submitted with certification
☐ ☐ ☐	A-05	Permanent lifting equipment details and certification provided
☐ ☐ ☐	A-06	Easement documentation provided (where applicable)
☐ ☐ ☐	A-07	Substation drainage details (oil separation tank and/or discharge pump) supplied; EPA compliance demonstrated.
☐ ☐ ☐	A-08	Certificate of Classification for the substation enclosure provided by the Applicant's Building Certifier at practical completion
B. General Drawing Requirements		
☐ ☐ ☐	B-01	Substation (switchgear) location shown and identified as ground level, one level below ground, or one level above ground
☐ ☐ ☐	B-02	No non-Energex services pass through, over, or under the substation site (where directly on ground)
☐ ☐ ☐	B-03	Substation room/enclosure drawings include 1:50 plan, short section, and long section
☐ ☐ ☐	B-04	All Energex equipment shown, including transformers, 11 kV and LV switchgear, battery charger, fibre panels, interface panels, remote earthing, protection and SCADA equipment
☐ ☐ ☐	B-05	Relevant Energex standard construction details included (e.g. floor anchors, earth pockets, conduit cross-sections)
☐ ☐ ☐	B-06	Overall site plan shows substation location within the development
☐ ☐ ☐	B-07	Access routes shown for Energex equipment, personnel, and all Energex cables
☐ ☐ ☐	B-08	Unrestricted 24/7 Energex personnel access provided from street to substation
☐ ☐ ☐	B-09	External works by builder shown (including footpath conduits and cable jointing pits)
☐ ☐ ☐	B-10	Energex will not agree to EMF shielding being installed inside the substation. Provision must be made for this to be installed outside the substation room
☐ ☐ ☐	B-11	Consultant primary contact details clearly shown in note on drawings
☐ ☐ ☐	B-12	Drawings note requirement for substation inspection and handover to Energex at least 12 weeks prior to Date Supply Required
C. Access & Egress – Equipment Access		
☐ ☐ ☐	C-01	Equipment access route designed for minimum load rating of 25 tonnes
☐ ☐ ☐	C-02	Minimum straight-line equipment access width of 3000 mm provided
☐ ☐ ☐	C-03	Equipment access turning radii provided: ≥ 4900 mm internal and ≥ 7400 mm external (9000 mm preferred for equipment clearance)
☐ ☐ ☐	C-04	Vehicle access headroom ≥ 5.5 m provided, with access gradients $\leq 1:8$
☐ ☐ ☐	C-05	2.5m x 2.5m loading/landing slab (manual handling and loading slabs provided with gradients $\leq 1:20$)
☐ ☐ ☐	C-06	Indoor equipment access door provides clear opening ≥ 2500 W x 3100 H mm; (2100 mm minimum width permitted for oil transformer installations where applicable)
☐ ☐ ☐	C-07	Equipment access doors swing outward to 180 degrees and able to be pinned
☐ ☐ ☐	C-08	Floor anchors, cable pulling eyes, and bollards shown where required
☐ ☐ ☐	C-09	Permanent lifting equipment shown on drawings with certification provided

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Energex:		Customer:	
Work Request:	WR123456	Customer Name:	The Big Electron
Project:	C0123456	Location:	123 Main Street, Electricity City
Project Name:	SSAZT Amazing Towers	Consultant:	Subs 'r' us
Representative:	A. Sponsor	Date:	1/01/1970

Yes No N/A	Item ID	Requirement
C. Access & Egress – Equipment Hatch (if applicable)		
☐ ☐ ☐	C-10	Minimum equipment hatch opening of 2500 mm × 3000 mm provided (where applicable)
☐ ☐ ☐	C-11	Minimum 600 mm clearance zone provided around hatch opening (above and below)
☐ ☐ ☐	C-12	Retractable or swinging safety guard provided to equipment hatch
☐ ☐ ☐	C-13	Weatherproof, self-draining retractable or swinging hatch tray provided for internal hatches
☐ ☐ ☐	C-14	Harness anchorage points provided in accordance with Energex BMS 01605 (????? Please advise relevant doco)
☐ ☐ ☐	C-15	Clearance above equipment hatch ≥ 5300 mm for crane access or ≥ 4300 mm for fixed beam with double hoist
C. Access & Egress – Personnel Access		
☐ ☐ ☐	C-16	Unrestricted 24/7 personnel access provided without notice
☐ ☐ ☐	C-17	Two independent personnel access doors provided, or one personnel door plus one suitable equipment access door
☐ ☐ ☐	C-18	Personnel access doors provide clear opening ≥ 800 W × 2000 H mm; Personnel access doors provide clear opening ≥ 1200 W × 2000 H for outdoor substations and where testing equipment is transported through
☐ ☐ ☐	C-19	Personnel access doors swing outward and are fitted with panic bars or large lever handles
☐ ☐ ☐	C-20	Personnel door hardware includes standing bolts to one leaf and Lockwood 570 series (or approved equivalent) to active leaf, with external key access and internal lever handle
☐ ☐ ☐	C-21	Door D-handles provided on both sides; external louvred doors comply with Drawing 7874-A4 and internal doors are 2-hour fire-rated timber
☐ ☐ ☐	C-22	Vermin-proof mesh fitted behind door louvres where louvres are installed
D. Room/Enclosure Clearances & Heights		
☐ ☐ ☐	D-01	Minimum 900 mm clearance maintained between equipment and walls or obstructions
☐ ☐ ☐	D-02	Minimum 1500 mm clearance provided in front of operated and maintained equipment
☐ ☐ ☐	D-03	Dry transformer HV and LV faces provided with minimum 1500 mm clearance along transformer length (i.e. 230mm0)
☐ ☐ ☐	D-04	Specific clearances met for switchgear installed (consult Energex for Technical Instruction for plant item)
☐ ☐ ☐	D-05	Minimum 2000mm clearance maintained behind SafePlus VT/metering unit
☐ ☐ ☐	D-06	Minimum 600 mm clearance provided on one side of the battery charger
☐ ☐ ☐	D-07	Ceiling height provided is ≥ 3200 mm for ABB SafeLink & SafePlus bottom entry substations
☐ ☐ ☐	D-08	Ceiling height provided is ≥ 3600 mm for control room only (no switchgear or transformers)
☐ ☐ ☐	D-09	Ceiling height provided is ≥ 4000 mm for bottom-entry switchgear and ≥ 4600 mm for top-entry switchgear

Drawing Submission Checklist for Customer Substations

Energex Manual 00293 - Commercial and Industrial Substation Manual - Version 12

This checklist is to be used in conjunction with Energex Manual 00293 and does not replace or supersede the requirements of that manual.

Energex:		Customer:	
Work Request:	WR123456	Customer Name:	The Big Electron
Project:	C0123456	Location:	123 Main Street, Electricity City
Project Name:	SSAZT Amazing Towers	Consultant:	Subs 'r' us
Representative:	A. Sponsor	Date:	1/01/1970

Yes No N/A	Item ID	Requirement
E. Construction – Structure & Finishes		
☐ ☐ ☐	E-01	Drained cavity wall construction provided for external walls below ground
☐ ☐ ☐	E-02	Indoor substation block walls fully concrete-filled
☐ ☐ ☐	E-03	Substation chamber isolated from remainder of building by minimum 2-hour fire-rated construction (walls, doors, and risers)
☐ ☐ ☐	E-04	Construction details prevent ingress of vermin and birds
☐ ☐ ☐	E-05	Internal walls painted Light Straw and ceilings finished in gloss white
☐ ☐ ☐	E-06	Non-galvanised steelwork primed and finished in grey paint
☐ ☐ ☐	E-07	Substation doors finished in neutral colour; aluminium doors clear anodised and lacquered
☐ ☐ ☐	E-08	Floors sealed in dry-type transformer rooms
E. Construction – Substation Trench		
☐ ☐ ☐	E-09	Substation trench provided with minimum depth of 1200 mm and width of 900 mm
☐ ☐ ☐	E-10	Suspended slab over transformer trench provided at 1500 mm width for oil transformers or 1100 mm for dry transformers
☐ ☐ ☐	E-11	Trench corners and junctions below slab formed with 300 mm radius undercut and rounded edges
☐ ☐ ☐	E-12	Trench T intersections provided with steel work to support pit lid covers
☐ ☐ ☐	E-13	Trench covers and rebates detailed, including one-piece covers at T and L intersections, flush with rebates
☐ ☐ ☐	E-14	Substation trench suitably drained and compliant with local council and EPA requirements
F. Conduits & Cables – Conduits/Ducts		
☐ ☐ ☐	F-01	Applicable Energex conduit and cabling standards referenced on drawings
☐ ☐ ☐	F-02	Minimum conduit bend radius of 1830 mm maintained with no tight elbows
☐ ☐ ☐	F-03	Conduit cross-sections shown for internal development and footpath installations
☐ ☐ ☐	F-04	Draw ropes provided and conduit entries bell-mouthed
☐ ☐ ☐	F-05	Conduits sealed against water ingress before and after cabling in accordance with Drawing 7882-A4
☐ ☐ ☐	F-06	Conduits and cable penetrations provided with 2-hour fire-rated encasement where required
☐ ☐ ☐	F-07	Equipment not placed underneath conduit entry points (to avoid water ingress to equipment)
F. Conduits & Cables – LV Cabling		
☐ ☐ ☐	F-08	LV cable stands and guards provided in accordance with Energex specifications where applicable
☐ ☐ ☐	F-09	Flexible braid connectors provided where specified
☐ ☐ ☐	F-10	LV cable guards installed in accordance with Energex specifications

Drawing Submission Checklist for Customer Substations

Energex Manual 00293 - Commercial and Industrial Substation Manual - Version 12

This checklist is to be used in conjunction with Energex Manual 00293 and does not replace or supersede the requirements of that manual.

Energex:		Customer:	
Work Request:	WR123456	Customer Name:	The Big Electron
Project:	C0123456	Location:	123 Main Street, Electricity City
Project Name:	SSAZT Amazing Towers	Consultant:	Subs 'r' us
Representative:	A. Sponsor	Date:	1/01/1970

Yes No N/A	Item ID	Requirement
F. Conduits & Cables – Cable Risers		
☐ ☐ ☐	F-11	Cable risers provided with minimum width of 900 mm and depth of 300–450 mm
☐ ☐ ☐	F-12	Minimum 1500 mm clear working zone provided in front of cable riser doors
☐ ☐ ☐	F-13	Cable riser doors provided full-height and full-width at each building level
☐ ☐ ☐	F-14	Cable riser supports provided using Unistrut or equivalent at maximum 1000 mm vertical spacing
☐ ☐ ☐	F-15	False ceilings above risers removable and area above kept clear of services
☐ ☐ ☐	F-16	Cable risers provided with minimum 2-hour fire rating
☐ ☐ ☐	F-17	Cable pulling eyes provided at top of riser and along cable routes where required
F. Conduits & Cables – Cable Tray/Ladder		
☐ ☐ ☐	F-18	Cable tray and ladder systems advised by Energex representative on consultant's drawing (sketch/red-penned)
☐ ☐ ☐	F-19	Cable tray and ladder systems centre-supported or wall-cantilevered
☐ ☐ ☐	F-20	Cable tray support brackets provided at approximately 600 mm spacing, with ladder spacing between 1000 mm and 1500 mm
☐ ☐ ☐	F-21	Cable tray support brackets braced to end walls
☐ ☐ ☐	F-22	Minimum 300 mm clearance maintained between cable trays and underside of slabs or services
☐ ☐ ☐	F-23	Cable trays and ladders installed below other services
☐ ☐ ☐	F-24	Cable tray and ladder systems provided with 2-hour fire protection where required
☐ ☐ ☐	F-25	Communications cable trays not to be installed until after substation room handover without agreement from Energex Supervisor
G. Earthing – General		
☐ ☐ ☐	G-01	Relevant applicable drawings/standards referenced.
☐ ☐ ☐	G-02	Earthing study conducted as per AS2067 for customer HV connections.
G. Earthing – Risers & Identification		
		Pockets:
☐ ☐ ☐	G-03	Earth pocket layout shown (outdoor substations: chase between pockets; indoor substations: chase across doorway only)
☐ ☐ ☐	G-04	Customer local earthing system provided and isolated from Energex substation earthing system
		Remote Earth Grid:
☐ ☐ ☐	G-05	Two separate earth riser conduits provided
☐ ☐ ☐	G-06	Earth riser conduits provided at minimum 63 mm diameter and structurally encased or protected by outer steel or HAT section where surface-mounted
☐ ☐ ☐	G-07	Earth riser and test pockets provided with removable covers and Energex identification
☐ ☐ ☐	G-08	Earth ring cable identification plates embedded in concrete

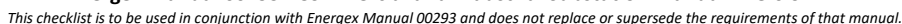
Drawing Submission Checklist for Customer Substations

Energen Manual 00293 - Commercial and Industrial Substation Manual - Version 12

This checklist is to be used in conjunction with Energen Manual 00293 and does not replace or supersede the requirements of that manual.

Energen:		Customer:	
Work Request:	WR123456	Customer Name:	The Big Electron
Project:	C0123456	Location:	123 Main Street, Electricity City
Project Name:	SSAZT Amazing Towers	Consultant:	Subs 'r' us
Representative:	A. Sponsor	Date:	1/01/1970

Yes No N/A	Item ID	Requirement
H. Substation Light & Power		
☐ ☐ ☐	H-01	Substation lighting layout and minimum 2 x GPO/socket outlet locations shown (locations in consultation with Energen)
☐ ☐ ☐	H-02	Substation switchboard supplied from the Essential Supply section of the Main Switchboard
☐ ☐ ☐	H-03	Light fittings not installed above plant or electrical equipment
☐ ☐ ☐	H-04	Personnel doors or stairwells fitted with micro-switches to automatically activate lighting
☐ ☐ ☐	H-05	Heavy-duty light switches provided adjacent to personnel access doors
☐ ☐ ☐	H-06	1 x 3 phase – per battery charger - supply permanently connected to an 63A isolator (not socket outlet) (location specified by Energen). Non-RCD. (locations in consultation with Energen)
☐ ☐ ☐	H-07	Ventilation fan controls provided with ON / OFF / AUTO settings and thermostat setpoint of 28°C
I. Ventilation (Mechanical)		
☐ ☐ ☐	I-01	Mechanical ventilation design certified by a practising RPEQ mechanical engineer
☐ ☐ ☐	I-02	Minimum 900 mm clearance maintained between ventilation equipment and adjacent plant
☐ ☐ ☐	I-03	Ventilation duct outlets provided at minimum 100 mm above finished floor level
☐ ☐ ☐	I-04	Fire dampers detailed and installed where required
☐ ☐ ☐	I-05	At least one ventilation fan permanently operational to maintain positive internal pressure
☐ ☐ ☐	I-06	Fan control ON/OFF/AUTO; thermostat setpoint 28°C
☐ ☐ ☐	I-07	Ventilation outlet located at top of room on opposite side to fan, fitted with vermin-proof mesh
J. Battery Ventilation		
☐ ☐ ☐	J-01	Battery Ventilation designed to AS2676 part 1 & 2 and AS 3011.2 (as required and in consultation with Energen)
☐ ☐ ☐	J-02	External exhaust and wall penetration for Energen battery rack ventilation systems
K. External Works by Developer		
☐ ☐ ☐	K-01	Footpath conduit quantities, sizes, and configurations shown in accordance with Energen standards
☐ ☐ ☐	K-02	Conduit installations inspected prior to backfilling, with inspection noted on drawings
☐ ☐ ☐	K-03	Intake cable pit type and dimensions shown
☐ ☐ ☐	K-04	Cable bell-mouth provided at development entry
L. Fire Detection & Penetrations		
☐ ☐ ☐	L-01	Smoke detection provided in accordance with AS 1670 and project requirements
☐ ☐ ☐	L-02	Fire detectors accessible for maintenance and not located directly in airflow paths
☐ ☐ ☐	L-03	Cable gallery fire detection provided where applicable
☐ ☐ ☐	L-04	Substation Fire Control and Indicating Equipment (SFCIE) location shown where applicable
☐ ☐ ☐	L-05	All service penetrations fire-rated to the required Fire Resistance Level (FRL) with sealing details shown
☐ ☐ ☐	L-06	Emergency exit paths clearly identified on drawings



Submission Checklist for Customer Substations

To be used in conjunction with C&I Manual – Not a Substitute

Project	Project Name and Location
Planner	
Date / /	Consultant

Certifications and/or other requirement checklist			
N/A	Yes	No	
☐	☐	☐	Supply confirmation proposed substation floor 75mm above Interim Residential Flood Level (IRFL)
☐	☐	☐	Fire detection and protection system installed and certified before substation energisation
☐	☐	☐	Supply single line diagram of consumers mains and main switch board
☐	☐	☐	Supply mechanical ventilation design with certification
☐	☐	☐	Supply detail of permanent lifting equipment with certification
☐	☐	☐	Supply easement documentation
☐	☐	☐	Supply substation drainage details – Oil separation tank and/or discharge pump and compliance with the EPA
☐	☐	☐	Note to Provide Certificate of Classification for substation enclosure from Applicant's Building Certifier upon practical completion

Energex cannot progress this project to design or construction until all the applicable requirements above have been fulfilled.

Substation Drawing Checklist

1 – General Drawing Requirements			
N/A	Yes	No	
☐	☐	☐	Substation (Switchgear) located at ground level, one level below ground or one level above ground
☐	☐	☐	No other services to pass through or under (if directly on ground) substation site
☐	☐	☐	Substation room/enclosure detail to include 1:50 plan view plus short and long section views
☐	☐	☐	Show all Energex Equipment – Transformers, 11kV and LV switchgear, battery charger, pilot isolation cubicles, fibre optic panels, interface panels and remote earthing
☐	☐	☐	Include drawings of relevant Energex Standards eg. Floor anchor, earth pockets, conduit X-sections
☐	☐	☐	Include an overall site drawing showing location of substation within the development
☐	☐	☐	Detail access route for Energex equipment, personnel and all Energex cables
☐	☐	☐	Provision of 24 hour personnel unrestricted (Energex dedicated) emergency access from street to substation
☐	☐	☐	Include full details of external works to be done by builder eg. footpath conduits, cable jointing pit
☐	☐	☐	Energex will not agree to EMF shielding being installed inside the substation. Provision must be made for this to be installed outside the substation room
☐	☐	☐	Note on drawing – Consultant primary contact details as first point of call for construction queries
☐	☐	☐	Note on drawing – Substation to be inspected and handed to Energex 12 weeks prior to Date Supply Required

2 – Access			
N/A	Yes	No	
2.1 General			
Equipment			
☐	☐	☐	Confirmation on drawing of 25 tonne load capacity along equipment access route
☐	☐	☐	3000mm minimum width along straight equipment access route
☐	☐	☐	Turning radius along access route:- Minimum turning radii – 4900 inside, 7400 outside with 9000 minimum outside radius for equipment clearance
☐	☐	☐	Vehicle headroom no less than 5.5m (slope not exceeding 1:8)
☐	☐	☐	2500mm ² loading slab (slope not exceeding 1:20 includes in all manual handling areas)
☐	☐	☐	Minimum clear opening of 2500mm (2100mm for oil transformers) x 3100mm (indoor)
☐	☐	☐	Doors swing outwards to 180 degrees
☐	☐	☐	All floor anchors shown
☐	☐	☐	Cable pulling eyes shown
☐	☐	☐	Bollard shown if required
☐	☐	☐	Permanent lifting equipment shown. Certification supplied to Energex
Hatch			
☐	☐	☐	Minimum size 2500mm x 3000mm
☐	☐	☐	600mm clearance zone around hatch opening (above and below)
☐	☐	☐	Retractable or swinging safety guard
☐	☐	☐	Retractable or swinging weatherproof and self draining tray (for hatch inside substation room only)
☐	☐	☐	Harness anchoring points as per Energex BMS 01605
☐	☐	☐	Clearance above hatch – 5300mm using crane OR 4300mm using non retractable beam with double hoist
Personnel			
☐	☐	☐	Detail arrangement of unrestricted access without notice – 24 hours 7 days a week
☐	☐	☐	Doors swing outwards
2.2 Outdoor Substations			
Personnel			
☐	☐	☐	Minimum clear opening of 1200mm
2.3 Indoor Substations			
Equipment			
☐	☐	☐	One door leaf secured with standing bolt (top and bottom), the other door leaf fitted with Lockwood 570 series or similar
☐	☐	☐	Door operated by key from outside and Lockwood lever handle on inside
☐	☐	☐	Each door fitted with D handles on both sides. Vermin proof mesh fitted to rear of louvers
☐	☐	☐	Doors with louvers as Drawing 7874-A4 (external doors only – internal doors 2 hour fire rated timber)
Personnel			
☐	☐	☐	Two separate personnel access doorways (or one personnel plus a suitable equipment access door)
☐	☐	☐	Minimum clear opening of 800mm x 2000mm
☐	☐	☐	Fitting of Panic bars or large levers on designated personnel doors

3 – Substation Room / Enclosure Clearances – 1.6			
N/A	Yes	No	
Outdoor			
☐	☐	☐	Clearances 900mm between equipment and walls and other obstructions 1500mm in front of operating equipment
Indoor			
☐	☐	☐	Ceiling height; Bottom entry – 3200mm, Top entry – 3750mm
☐	☐	☐	Clearances 900mm between equipment and walls and other obstructions OR 1200mm for top entry 1500mm in front of the HV and LV side of dry transformers (ie along the 2300 length) 1500mm in front of operating equipment – HV and LV Sw Gr, pilot isolation cubicle, Battery Charger 1500mm between pilot isolation cubicle and earthed metal
4 – Construction			
N/A	Yes	No	
4.1 General			
☐	☐	☐	Drained cavity wall (for external walls below ground)
☐	☐	☐	All block walls concrete filled (indoor substations)
☐	☐	☐	Chamber isolated from remainder of building with a 2 hour fire rating
☐	☐	☐	Construction prevents the entry of vermin and birds
4.2 References to Painting			
☐	☐	☐	Walls – Light straw and Ceiling – Gross white
☐	☐	☐	Steel work – Non galvanised metal (primed and grey paint)
☐	☐	☐	Doors – Neutral (aluminium to be finished with clear anodising and clear lacquer)
☐	☐	☐	Floors – Sealed for Dry Type transformers
4.3 Trench			
☐	☐	☐	Minimum 1200 deep 900 wide
☐	☐	☐	Suspended slab over trench for transformer (width:- 1500mm for oil transformers OR 1100mm for dry transformers)
☐	☐	☐	Trench junctions and corners below slab – 300mm radius undercut with <u>rounded edges</u>
☐	☐	☐	Trench covers and rebates (plywood – indoor or galvanised steel – outdoor)
☐	☐	☐	Specifically cut one piece covers for trench 'T's and 'L's – level with bottom of trench cover rebate
☐	☐	☐	Suitably drained complying with local council requirements and EPA regulations
5 – Conduits and Cable			
N/A	Yes	No	
5.1 Conduits			
☐	☐	☐	Show applicable drawing standards
☐	☐	☐	Reference to minimum radius bends of 1830mm
☐	☐	☐	Include conduit cross-section drawings (for inside development and for footpath)
☐	☐	☐	Draw rope reference
☐	☐	☐	Entries to be bell mouthed
☐	☐	☐	Conduits / cable ducts sealed to prevent ingress of water before and after installation of cables 7882-A4
☐	☐	☐	2 hour fire rating encased

5.2 Cable Stand			
☐	☐	☐	Show applicable drawing standards
☐	☐	☐	Low voltage stand Energex specifications
☐	☐	☐	Flexible braids connectors supplied
☐	☐	☐	Low voltage cable guard to Energex specifications
5.3 Cable Risers			
☐	☐	☐	Minimum width 900mm and depth, Minimum 300mm and Maximum 450mm
☐	☐	☐	Unimpeded access – 1500mm clear area in front of riser door
☐	☐	☐	Full width and height doors on each level of building
☐	☐	☐	Unistrut or similar fixed at a minimum vertical spacings of 1000mm
☐	☐	☐	False ceiling to be removable and area above to be kept clear of services
☐	☐	☐	2 hour fire rated
☐	☐	☐	2 cabling pulling eyes at top of riser and where required along internal cable route
5.4 Cable Tray / Ladder / T-Brackets inside substation room			
☐	☐	☐	Show applicable drawing standards
☐	☐	☐	Supported along the <u>centre line only</u> or cantilevered off wall
☐	☐	☐	Brackets at 600mm spacing, between centres (Ladder between 1000mm and 1500mm)
☐	☐	☐	Cable support brackets braced to end walls
☐	☐	☐	Not to install comms cable tray after hand over of sub room and after discussion Energex supervisor
5.5 Internal cable route between substation and remote transformers			
☐	☐	☐	300mm minimum clearance between ladder / tray and underside of supporting slab or services
☐	☐	☐	Placed under all other services
☐	☐	☐	2 hour fire rating encased
6 – Earthing			
N/A	Yes	No	
6.1 Pockets			
☐	☐	☐	Show applicable drawing standards
☐	☐	☐	Chase between pockets for outdoor stations
☐	☐	☐	Chase across doorway only for indoor stations
☐	☐	☐	Customer to provide their own local Earthing arrangements (not to be connected to Energex Substation earth)
6.2 Remote Earth Grid			
☐	☐	☐	Show applicable drawing standards
☐	☐	☐	Clear of obstacles and building lightning protection system
☐	☐	☐	Two separate earth riser conduits
☐	☐	☐	(63)mm encased structurally or outer steel pipe or HAT section for surface mounted
☐	☐	☐	Earth riser and test pockets formed with removable covers fitted with Energex identification
☐	☐	☐	Earth ring cable identification plates imbedded in concrete

7 – Substation Light and Power			
N/A	Yes	No	
☐	☐	☐	Plan of lighting layout and location of power outlets
☐	☐	☐	Switchboard – supplied from Essential Supply section of Main Switchboard
☐	☐	☐	Fluorescent light fittings – Not above plant
☐	☐	☐	Micro switch to personnel door or stairwell to activate light
☐	☐	☐	Light switches (heavy duty) adjacent to personnel doors
☐	☐	☐	Minimum of two GPO's plus and battery charger supply (to be hard wired via junction box or isolator)
☐	☐	☐	Fan control switch ON, OFF, AUTO (thermostat set point 28°C)

8 – Ventilation			
N/A	Yes	No	
☐	☐	☐	Certification by practising mechanical engineer
☐	☐	☐	Clearances 900mm to any equipment
☐	☐	☐	Duct 100mm from floor
☐	☐	☐	Fire Dampers
☐	☐	☐	At least one fan or additional fan to be permanently operational to maintain positive pressure
☐	☐	☐	Fan control switch ON, OFF, AUTO (thermostat set point 28°C)
☐	☐	☐	Ventilation outlet at top of room on opposite side to fan with vermin proof mesh fitted

9 – External Works by Developer			
N/A	Yes	No	
Conduits / Cable pit			
☐	☐	☐	Show applicable drawing standards
☐	☐	☐	Footpath conduits – quantity, size and configuration
☐	☐	☐	Note to inspect conduit installation before backfilling
☐	☐	☐	Intake cable pit type and pit dimensions
☐	☐	☐	Cable bell into development

Comments