

Substation Design Instruction

ABB Stromberg category 1 LV switchgear

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SUBSTATION DESIGN INSTRUCTION

PRIMARY SYSTEMS

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SDI 252 ABB Stromberg category 1 LV switchgear

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1.0 PURPOSE

This standard provides technical and reference information to assist with the safe design, installation, commissioning, operation and decommissioning of ABB Stromberg category 1 low voltage switchgear.

2.0 SCOPE

This instruction provides information and reference documentation to assist in the safe design, installation, commissioning, operation and decommissioning of ABB Stromberg category 1 low voltage switchgear. This instruction deals only with the standard units that were previously approved for use by Endeavour Energy in the distribution network as detailed in 5.1.2.

The scope of this document provides reference to the various lifecycle stages of the switchgear and therefore should be read in conjunction with the references of 3.0 and :

- Mounting and construction requirements: refer MCI0006
- Earthing design, construction and testing: refer EDI100
- Specification of new equipment: refer ETS0068
- General details and minimum design requirements: refer SDI101 and MDI0028
- Testing and commissioning: refer SDI120
- Ongoing maintenance requirements: refer SMI101
- Standard drawing requirements: SAD0001

Note: This switchgear is no longer approved for use on Endeavour Energy's network. This instruction is for reference purposes only.

3.0 REFERENCES

- Company Policy 9.2.2 - Network Protection
- Company Policy 9.2.5 - Network Asset Design
- Company Policy 9.7.1 - Network Asset Constructions
- Company Policy 9.8.3 - Network Operations
- Company Policy 9.9.1 - Network Asset Maintenance
- Company Policy 9.2.10 - Network Asset Ratings
- Company Procedure (Supply Management) GSU 0006 - Disposal of surplus goods and materials
- Company Procedure (Health & Safety) GSY 0051 - Health and safety incident management
- Division Procedure (Network) GNV 1062 - Granting dispensation from network standards
- ENA National Electricity Network Safety Code (Doc 01-2008)
- *Occupational Health and Safety Act 2000*
- Company Network Management Plan 2009-2014
- Equipment Technical Specification ETS 0071 – Distribution fuses
- Substation Design Instruction SDI 101 – Distribution substations: general details and minimum requirements
- Mains Construction Instruction MCI 0006 – Underground distribution : Construction standards manual

- Mains Design Instruction MDI 0028 – Underground distribution network design
- AS/NZS 3947.3:2001 – Low voltage switchgear and controlgear – Switches, disconnectors, switch-disconnectors and fuse combination units
- ABB FastLine distribution system 400-2500A user manual
- Branch Procedure NCB 4417 – Stromberg category 1 LV switchgear

4.0 DEFINITIONS AND ABBREVIATIONS

A full list of definitions is contained in SDI 101.

5.0 ACTIONS

5.1 General

5.1.1 Introduction

ABB Stromberg switchgear is a modular low voltage distribution system. It consists of either a three phase load break switch or a no load isolator complete with strip fuse bases, all of which are manually operated. The switchgear is designed for installation in padmount substations.

This instruction will reference the two (2) variations of Stromberg equipment. These variations are installed in two (2) distinct areas - South Coast Region/Southern Highlands and Endeavour Energy's western and northern areas. The two (2) variations incorporate different Stromberg components.

5.1.2 Product approval and stock codes

Endeavour Energy no longer approve or purchase these units.

Where work is required to extend or modify these units the complete LV board shall be replaced with the latest approved switchgear.

5.1.3 Dimensions, weight and description

Refer to clause 5.2 for full details on dimensions.

5.1.4 Technical specification

Stromberg LV switchgear is rated at 660V. The specifications at 660V are:

Insulation levels	Busbar	Incoming Isolator	Feeder fuse Isolator
Rated voltage	660V	1000V	660V
50Hz one (1) minute power freq. withstand Ph to E	-	-	-
1.2/50 μ s lightning impulse withstand (BIL) Ph to E	-	-	-
Rated frequency	50Hz	50Hz	50Hz
Insulation resistance at 1kV DC	-	-	-

Manufacturer rated currents - Busbars	Busbar	Incoming Isolator	Feeder fuse Isolator
Rated normal current	1250A	1250A	630A
Rated one sec. withstand current	50kA	50kA	50kA
Rated peak withstand current	105kA	105kA	50kA
Emergency make current on to fault	105kA	105kA	50kA
Emergency break current (at 0.35 pf lag)	-	5kA	-
Fuse link DIN size	2	2	2

5.1.4.1 De-rating factors

The rated currents of switchgear are determined under standard test conditions specified in AS/NZS 3947.3, which have little relation to conditions encountered in service in Endeavour Energy. Enclosure in a cubicle, attachment to other units, and high ambient temperatures all contribute to the need to de-rate equipment.

The table in clause 5.1.4.3 (below) gives the maximum allowable continuous current ratings for this switchgear under various service conditions. Failure to observe these limitations could result in serious damage to, or destruction of, equipment.

5.1.4.2 Derating labels

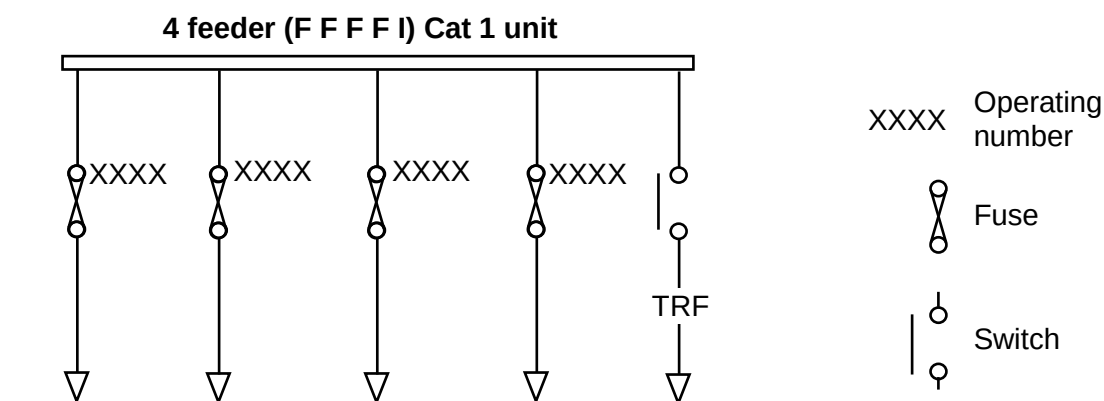
Labels shall be fitted to the front of the equipment which states the maximum rating of the equipment in line with the installation condition indicated in clause 5.1.4.3 below.

5.1.4.3 In service current ratings

Service location	Fuse strip type	Summer 40 deg. C ambient		Winter 10 deg. C ambient	
		Fitted with solid link	Fitted with 400A fuse-links	Fitted with 250A fuse-links	Fitted with 160A fuse-links
Padmount substation	OEPS 800A isolator + up to 4 630A OEPS fuse bases	800A	400A	800A	400A
	OETL 1250KM185 load break switch + up to four (4) fuse bases	700A	250A	1000A	250A

Note: Feeder loads must be monitored to check that total current does not exceed these ratings.

5.1.5 Single line diagram - Operating diagram symbol



5.1.6 Accessories

5.1.6.1 Extraction handle

For those boards where the fuses do not have integrated operating handles, there are two (2) types of handles available for fitting or removing isolator links and or fuse links.

5.1.6.2 Labelling

Labels to identify the LV switch number are to be fitted to the front area of the board.

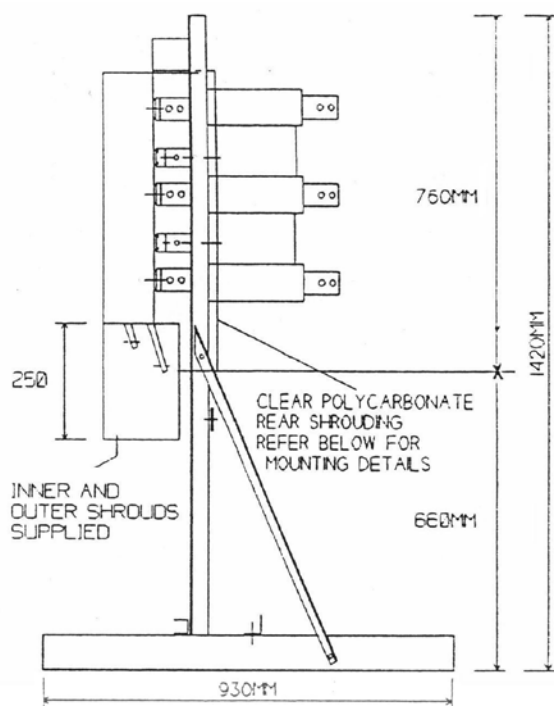


5.2 Installation

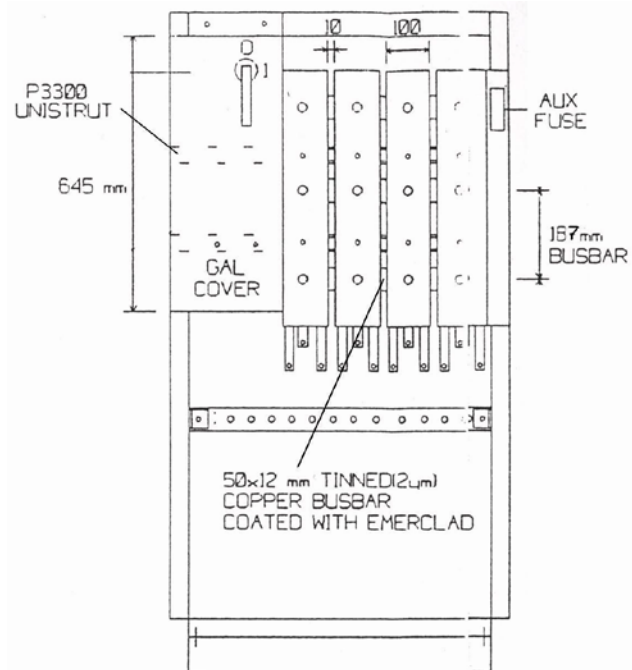
5.2.1 Distribution board – Endeavour Energy's northern and western areas

The fully assembled distribution board consists of one (1) mounting frame, one (1) incoming load break switch (side mounted), four (4) fuse bases, main busbars, covers, shrouds and one 63A auxiliary fuse assembly (mounted on **A** phase). Holes are provided in **B** and **C** phase busbars for two (2) additional 63A auxiliary fuse assemblies if required. However, as the sheet metal shrouding has to be suitably cut out they are not to be fitted while the switchboard is live.

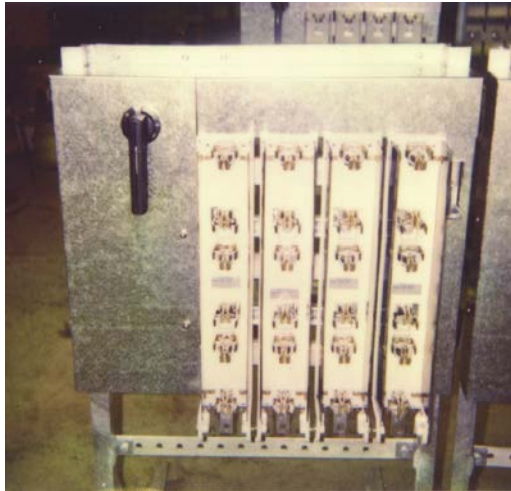
The rear shrouding is a clear polycarbonate sheet. The front and side shrouding is sheet metal. As this switchgear is not suitable for extending *live*, a four (4) feeder distribution board coupled with a one x 63A auxiliary fuse assembly is usually installed. Where less than four (4) feeder fuse bases are installed, the exposed busbars are to be shrouded with a busbar spare unit cover fabricated and fitted in accordance with Drawing no. 077057.



Side view



Front view



**Front view
(no fuse contact covers)**



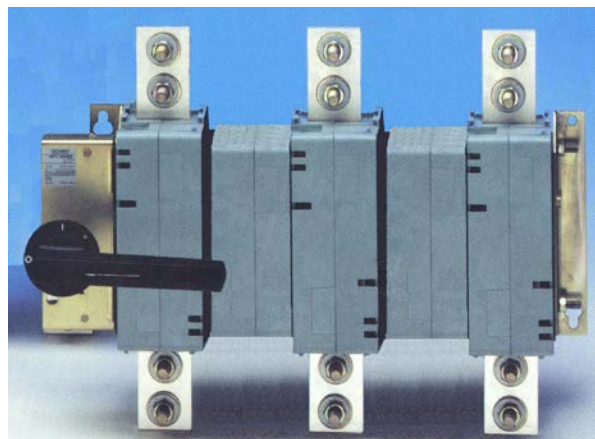
**Rear view
(no polycarbonate cover)**

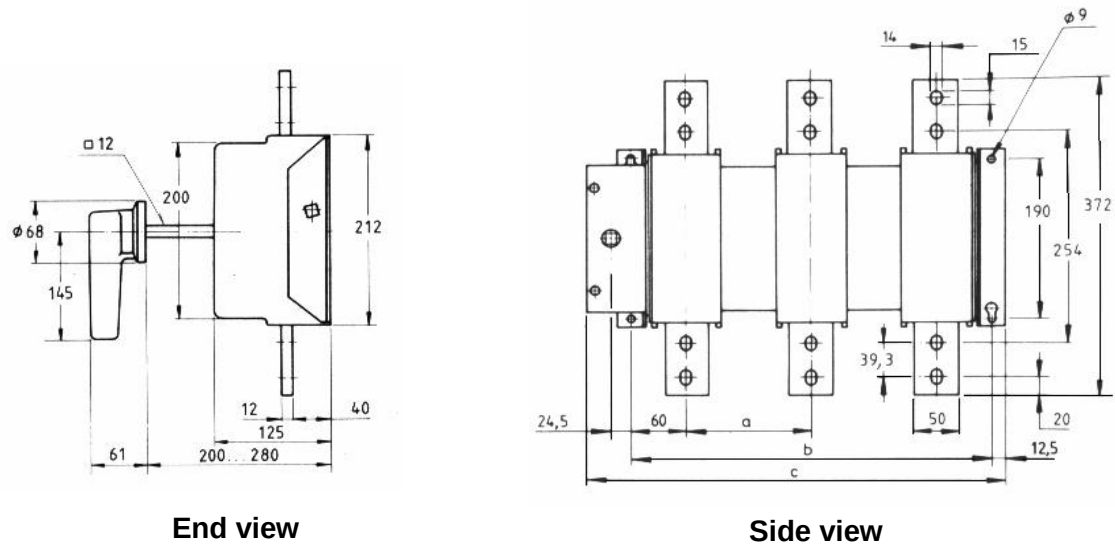


Distribution board with OEPS 800A isolator rather than the load break switch, and with fuse contact covers fitted.

5.2.1.1 Standard load break switch

The standard load break switch used on distribution boards in Endeavour Energy's northern and western areas is the Stromberg OETL 1250KM185. This is a 1250A switch with 185mm busbar spacing.

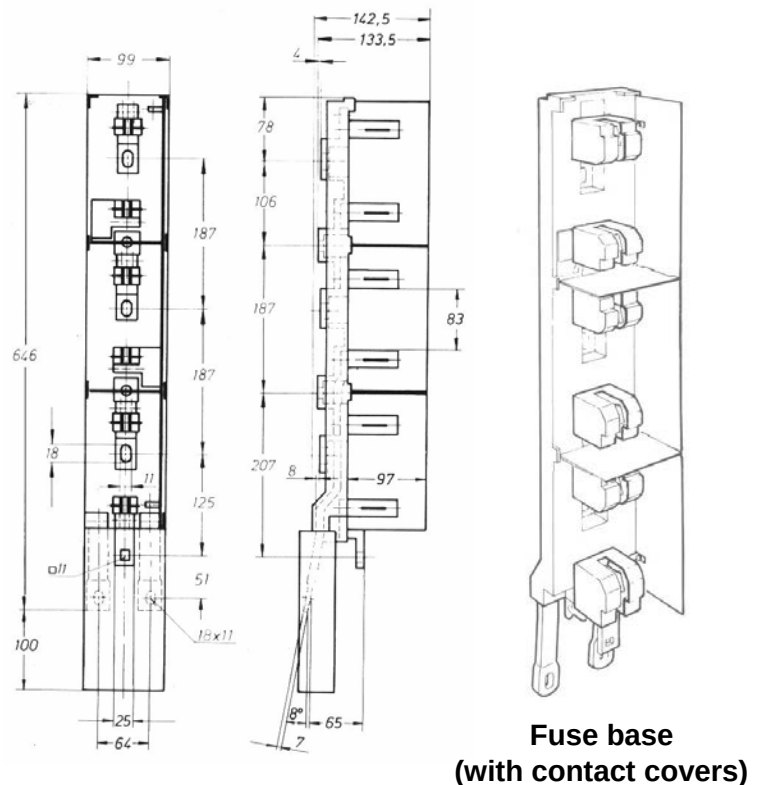




5.2.1.2 Standard feeder fuse base

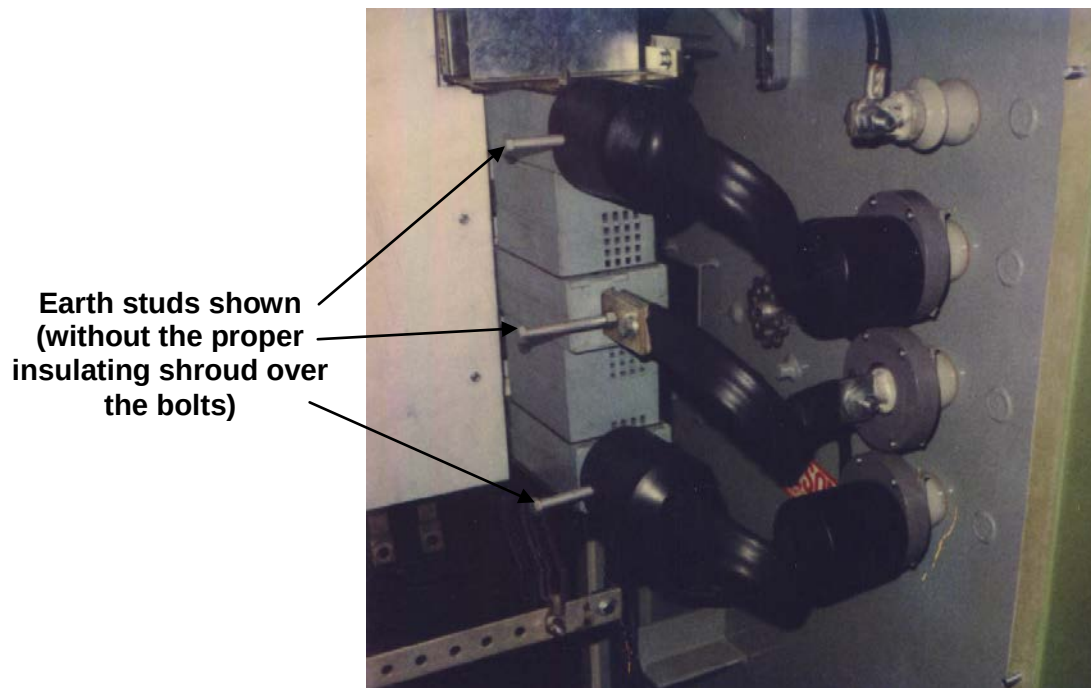
The standard feeder fuse base used on distribution boards in Endeavour Energy's northern and western areas is Stromberg OFASJ 3D2.

The feeder fuse isolator can be fitted DIN size 2 fuse links.



5.2.1.3 Transformer connection, insulation and earth test stud

Each phase of the load break switch connection is fitted with an earth test stud. Each earth test stud should come complete with a screw on insulating shroud, (although some have been installed with a bare bolt) that can be removed for connecting test lamps when phasing between transformer and busbar or for fitting earth sticks if earthing of the transformer LV is required.



5.2.2 Distribution board - south coast region/Moss Vale

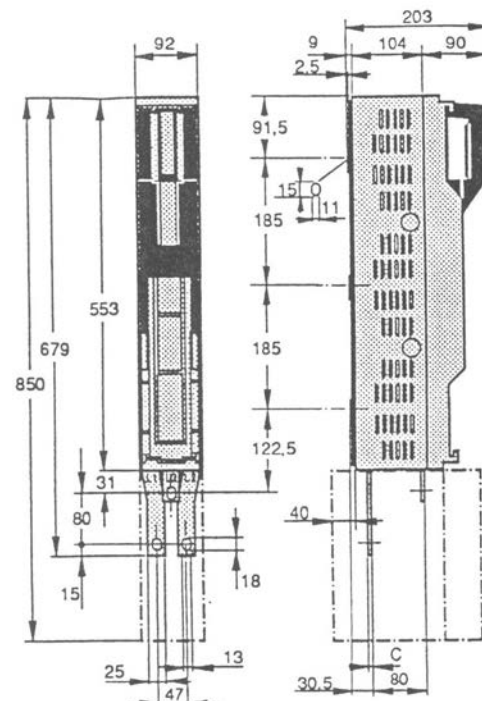
The fully assembled distribution board consists of one (1) mounting frame, one (1) incoming OEPS 3T L12/GL SRN 800 amp main isolator fitted with solid links, four (4) OEPS 3AL 12P SRN 630 amp fuse bases, and main busbars.

The switchgear is fitted with three phase manually operated handles.

No shrouding is provided on the rear and side. The switchgear is fully shrouded on the front. As this switchgear is not suitable for extending *live*, a four (4) feeder distribution board is usually installed.

5.2.2.1 Standard isolator

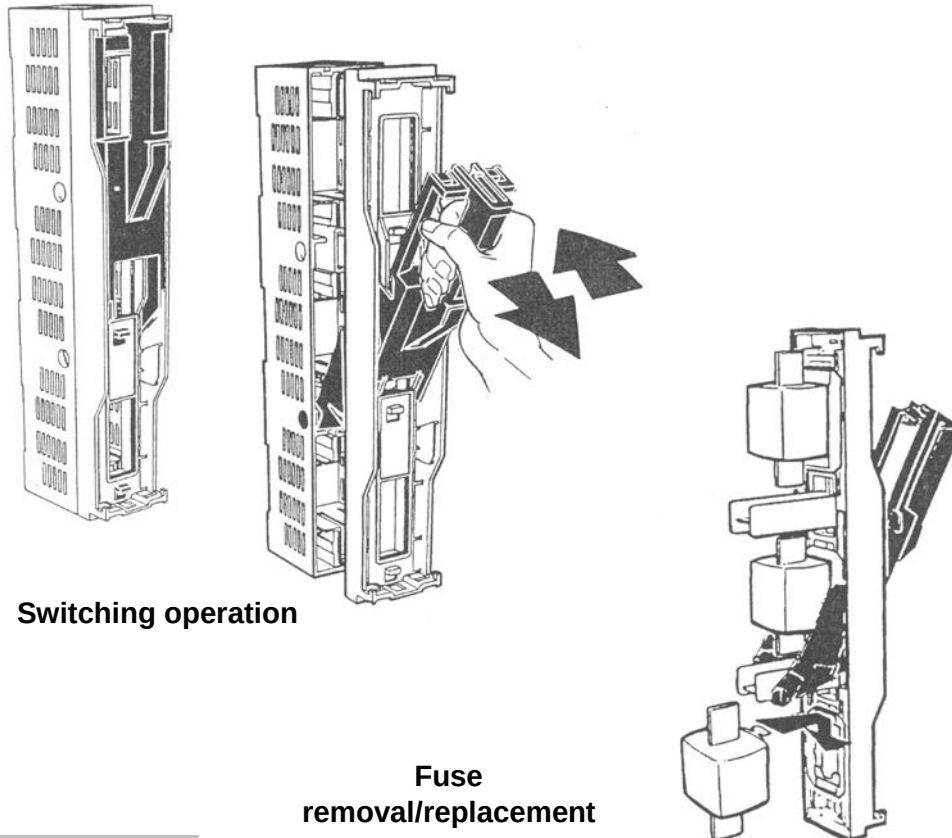
The standard isolator used on distribution boards in the south coast and southern highlands areas are the Stromberg OEPS 3T L12/GL SRN 800 amp and is fitted with solid links.



5.2.2.2 Standard feeder fuse base

The standard feeder fuse base used on distribution boards in the south coast and southern highlands areas are Stromberg OEPS 3AL 12P SRN, nominally rated at 630 amps.

The feeder fuse isolator can be fitted with DIN size 2 fuse links.



5.2.3 Cable terminations

5.2.3.1 Cable sizes

The preferred maximum size of cable that can be accommodated is three (3) core and single core cables up to 240mm².

5.2.3.2 Cable clamping

Suitable cable clamps are to be used to secure cables to the Unistrut rail provided at the bottom of each unit (refer to MCI 0006 for cable termination details).

5.2.3.3 Cable lugs

Approved single-hole cable lugs should be used for terminating on front connected feeder fuse bases. The width of this cable lug is not to exceed 35mm.

5.2.3.4 Cable connection covers

Each feeder fuse base is to be fitted with one (1) small and one (1) large cable termination cover shroud.

5.3 Operation and switching

As detailed in clause 5.2 there are two (2) types of LV board.

The LV board from the northern and western area has fuses that are individually inserted and removed using a separate extraction handle.

The LV board from the southern region has an handle that integrates the fuse holder and the fuse extraction handle. The three (3) individual LV fuses are captive in the one (1) operating handle. During operation of the handle all three (3) phases are switched.

5.4 Drawings

Note: These drawings reference only Stromberg equipment installed in Endeavour Energy's northern and western areas. The following drawings form part of this instruction:

Drawing	Amend.	Title
075230	D	11kV PM sub Stromberg LV switchgear frame arrangement
075231	F	11kV PM sub Stromberg LV switchgear frame fabn detail
076346	D	11kV PM sub 300kVA Stromberg LV conn. detail
076404	D	11kV PM sub 300kVA Stromberg LV flexible BB detail
076405	D	11kV PM sub 500kVA Stromberg LV flexible BB detail
076406	D	11kV PM sub 500kVA Stromberg LV conn. detail
076413	D	11/22kV PM sub LV switchgear shield cutout detail
076449	C	22kV PM sub earth stud and shroud detail
077057	A	11kV PM sub Stromberg LV swgr spare unit busbar cover detail
077180	C	22kV PM sub 300/500kVA Stromberg LV BB detail
077181	C	22kV PM sub 300/500kVA Stromberg LV conn. detail
078412	B	22kV PM sub Stromberg LV switchgear frame arrangement
078413	B	22kV PM sub Stromberg LV switchgear frame fabrication detail

6.0 AUTHORITIES AND RESPONSIBILITIES

The **Chief Engineer** has the authority and responsibility for approving this instruction and approving variations to the requirements of this instruction.

The **Manager Primary Systems** has the authority and responsibility for endorsing and recommending changes and revisions to this instruction.

The **Network Substations Manager, Primary Systems** shall be responsible for revising and updating this instruction in accordance with Company Policy and Procedures.

Regional Managers shall be responsible for ensuring that all designs carried out by Regional employees conform to the requirements of this instruction.

The **Manager Network Connections** shall be responsible for ensuring that all designs carried out by Level 3 ASPs conform to the requirements of this instruction.

It will be the ASP's responsibility to check that the latest issue of any instruction or drawing relevant to or listed in this manual is available and used during the design of any project.

7.0 DOCUMENT CONTROL

Documentation content coordinator: Network Substations Manager
Documentation process coordinator: Branch Process Coordinator