

Western Power's Asset Management System

Distribution Substation Plant Manual 2019 Chapter 7 – Superseded Equipment



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Content Owner/Custodian: Lines and Cables Design

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Document control

Endorsement approvals

	Name	Title	Signature & Date
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Record of revisions

Revision No.	Date	DM version	Revised by	Description
0	September 2019	0	Gareth Chadwick	Original (MKI MPS)
1	November 2019	2	Gareth Chadwick	Type1, 2 & 3 LV Switchgear assemblies added.

Key documents providing direction and influencing this document

Doc #	Title of document
DM# 40304923	Asset Management System
DM# 41965928	Safety in Design Guidelines
EDM# 50473207	DSPM Governance & Supporting Technical Documents Register

This document gives direction to and influences the following documents

Doc #	Title of document
Various DQM documents	Distribution Substation Design Projects

Stakeholders (people that were consulted when document was updated)

Position / Function / Section

Asset Management - Asset Performance

Asset Management – Safety Environment Quality and Training

Asset Management - Grid Transformation

Asset Operations – Network Operations

Asset Operations – Operational Services

Asset Operations – Network Connection Services and Emergency Management

Business and Customer Service – Customer Service

Notification list (people to be notified when document is updated)

Position / Function / Section

Asset Management - Asset Performance

Asset Management – Safety Environment Quality and Training

Asset Management - Grid Transformation

Asset Operations – Network Operations

Asset Operations – Operational Services

Asset Operations – Network Connection Services and Emergency Management

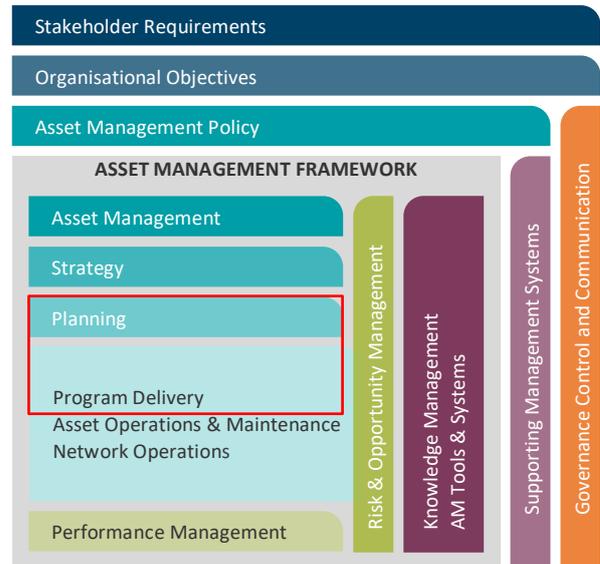
Business and Customer Service – Customer Service

This document must not be made available to personnel outside Western Power without the prior written approval of Western Power.

Document classification and hierarchy

A key requirement of the Western Power Asset Management Policy (AMP) is to develop and maintain an Asset Management System (AMS). This Distribution Substation Plant Manual is defined as an overarching / technical / governance document within the AMS document classification and structure and sits within the planning and Program Delivery component/s of the AMS.

The AMS and the interrelationships between the collection of documents, tools and systems that are used for asset management are described in the AMS document EDM# [40304923](#).



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1. Introduction

This Chapter of the Distribution Substation Plant Manual (DSPM) only contains legacy substation plant related information and drawings showing the standard plant arrangements previously used within Western Power's distribution substations

2. Disclaimer

The information contained within these drawings shall not be used for anything other than their intended purpose (as stated within this chapter). Other documents that refer to these drawings shall not change the intended purpose whether it is written or inferred.

This Chapter alone does not claim to demonstrate compliance with any Government Regulations or Industry Standards. These drawings are to be read in conjunction with the following Western Power documents:

- i. Western Australian Distribution Connections Manual (WADCM)
- ii. Underground Distribution Schemes Manual (UDSM)
- iii. Overhead Line Design Manual (OHLDM) for DSM 3-24 drawing.
- iv. Distribution Design Catalogue (DDC)

The drawings within this Chapter are generic in nature and may not be suitable for all substation sites. It is the designer's responsibility to make sure that these drawings are suitable for the proposed substation site prior to use.

3. Compliance with this Chapter of the Manual

This Chapter of the Distribution Substation Plant Manual contains information about legacy plant and the standard to be used for its installation. These drawings can be used as a guide when maintaining existing sites.

This information should not be used for new (green field sites). This information can be used as a reference when existing sites are being upgraded. All new green field and upgraded sites shall meet the current standards in the other Chapters of this manual.

4. Scope

This Chapter will only contain drawings for plant that has been superseded whilst the DSPM is in circulation. All other legacy plant is published within the standard of the day.

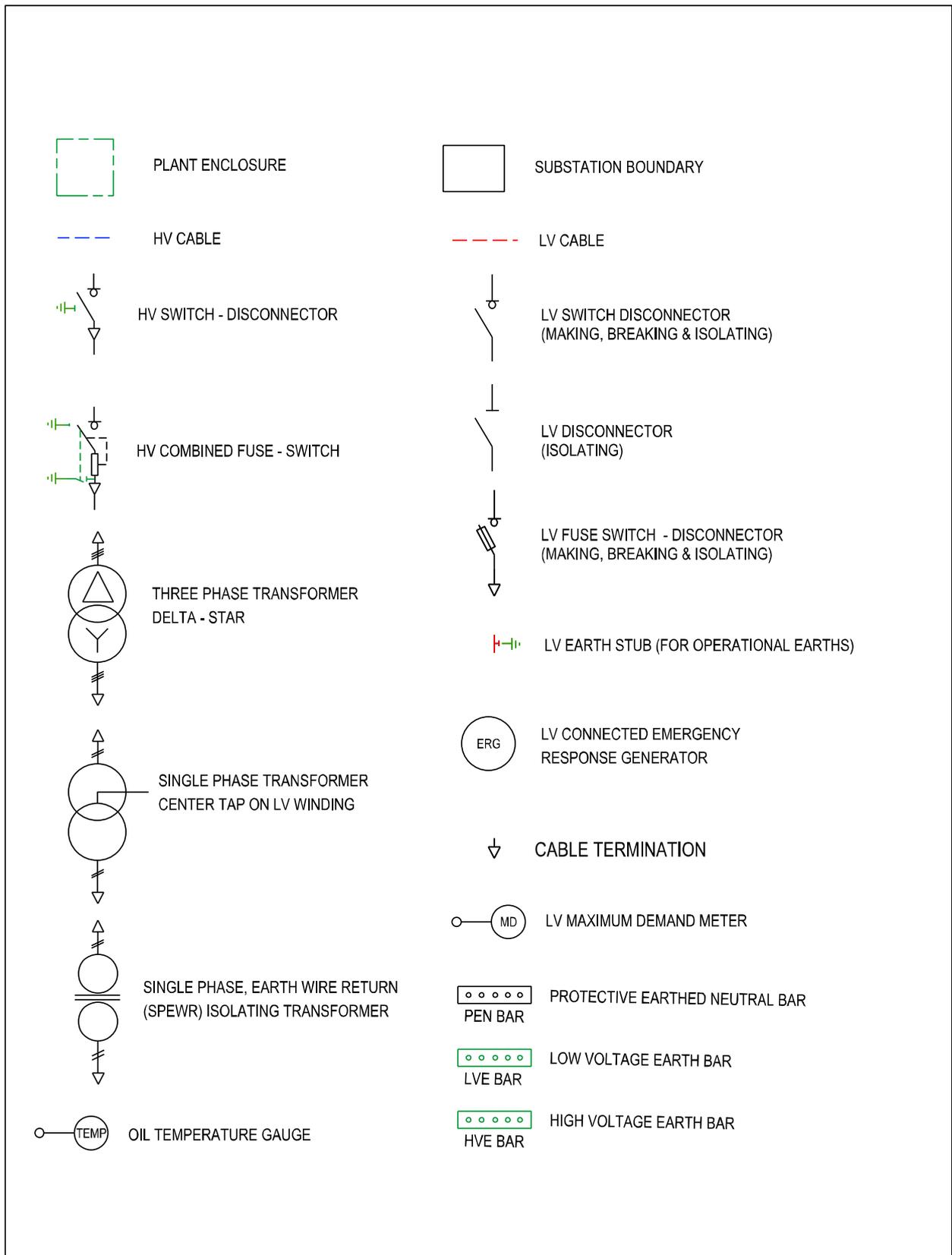
These standards include:

1. SECWA Distribution Substation Standards Manual 1984 (Black Book) [EDM# 23630836](#)
2. SECWA Distribution Substation Standards Manual 1993 (White Book) [EDM# 23630847](#)
3. Western Power DISTRIBUTION SUBSTATION MANUAL (DSM) 1997, 2002 and March 2007:
 - a. INTRODUCTION - ([EDM# 24016023](#))
 - b. SECTION 1 - CUSTOMER SUPPLY ARRANGEMENTS ([EDM# 25675560](#))
 - c. SECTION 2 - HV NETWORK ARRANGEMENTS ([EDM# 23580399](#))
 - d. SECTION 3 - SUBSTATION ARRANGEMENTS ([EDM# 23581570](#))
 - e. SECTION 4 - KIOSK ARRANGEMENT AND INSTALLATION GUIDE ([EDM# 23581608](#))
 - f. SECTION 5 - SUBSTATION FIRE PROTECTION REQUIREMENTS ([EDM# 23581631](#))
 - g. SECTION 6 – MISCELLANEOUS ([EDM# 23935652](#))

- h. SECTION 7 - SUPERSEDED EQUIPMENT INSTALLATION GUIDE ([EDM# 23936185](#))
- i. SECTION 8 - DISTRIBUTION AUTOMATION ([EDM# 23938100](#))
- j. SECTION 9 - 33KV SUBSTATION ARRANGEMENTS ([EDM# 23938132](#))

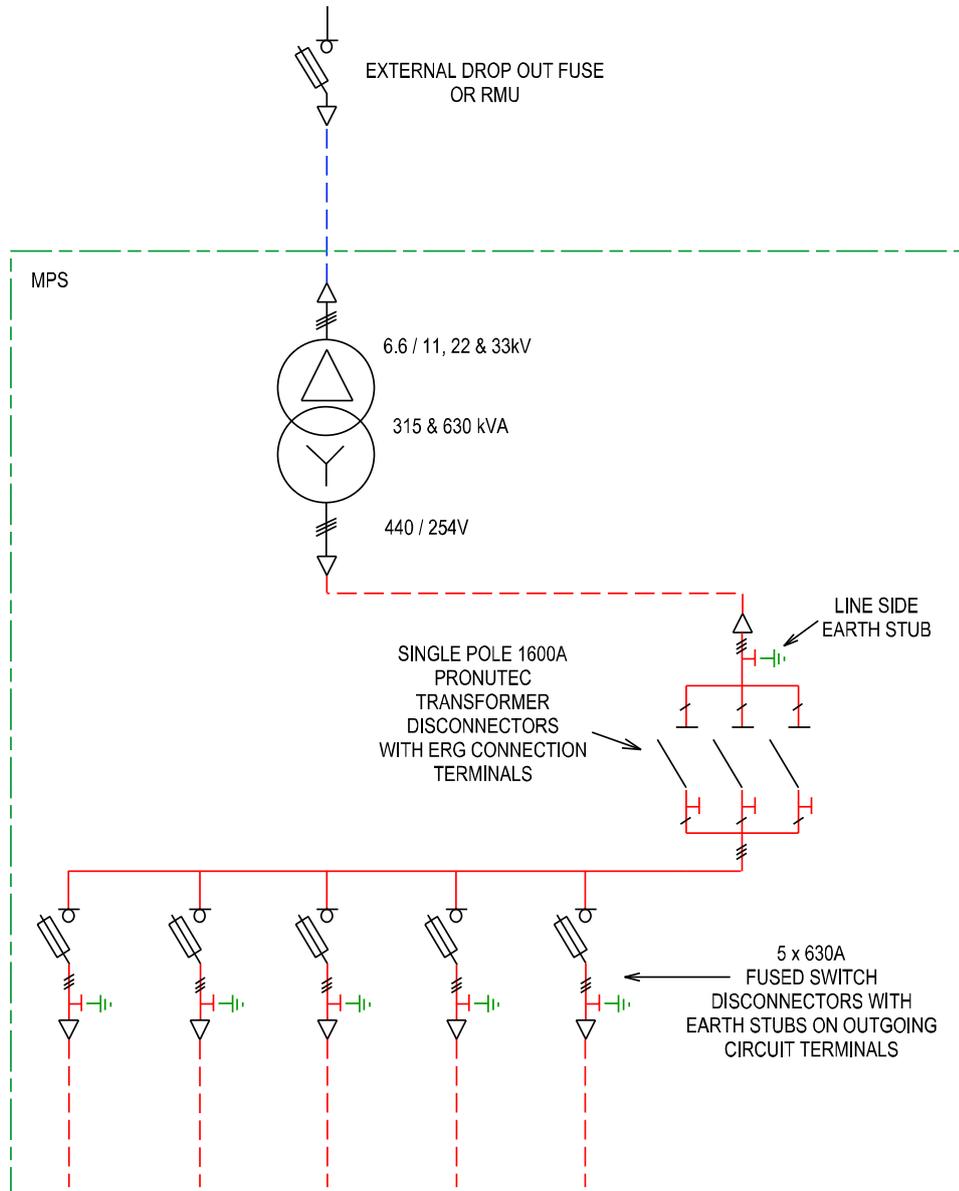
5. Superseded Equipment Drawings

5.1 Drawing Legend



				TITLE		DISTRIBUTION SUBSTATION PLANT MANUAL		westernpower	
				LEGEND FOR SINGLE LINE DIAGRAM		DRAWN: GC		DATE: 08-2019	
						CHECKED: AP		SCALE: NTS	
						APPROVED: AS		LEGEND	
						APPROVED: MS		REV. A SHT. 1/1	
REV. No.	DATE	DESCRIPTION	AM	AS					
A	08.2019	ORIGINAL ISSUE							

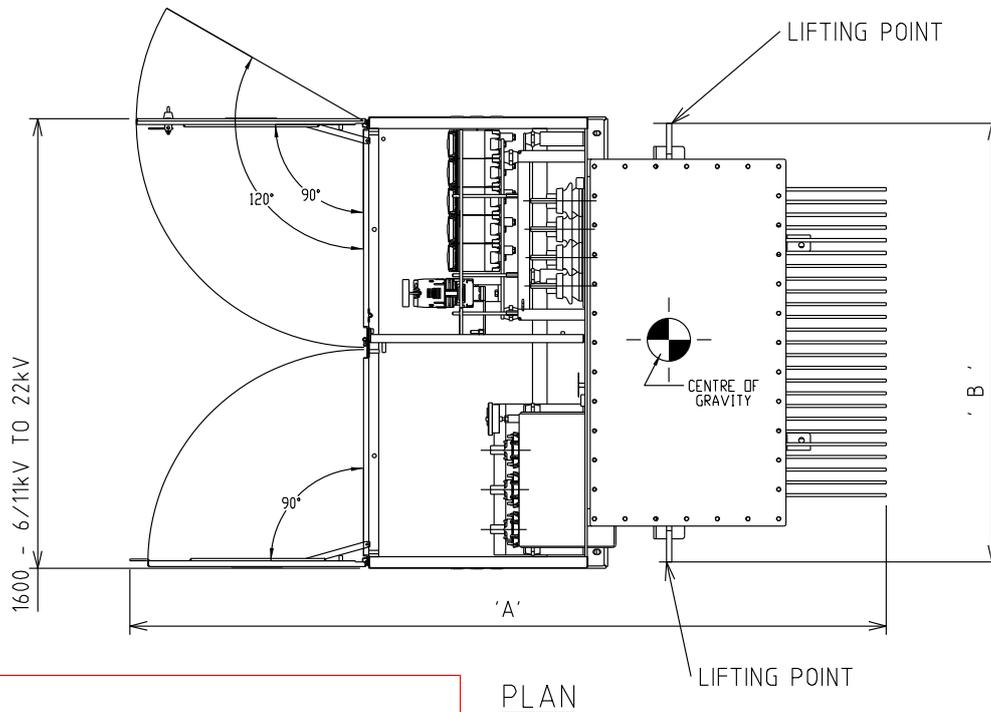
5.2 Tyree MKI Modular Package Substation (MPS)



OBSOLETE FOR REFERENCE ONLY

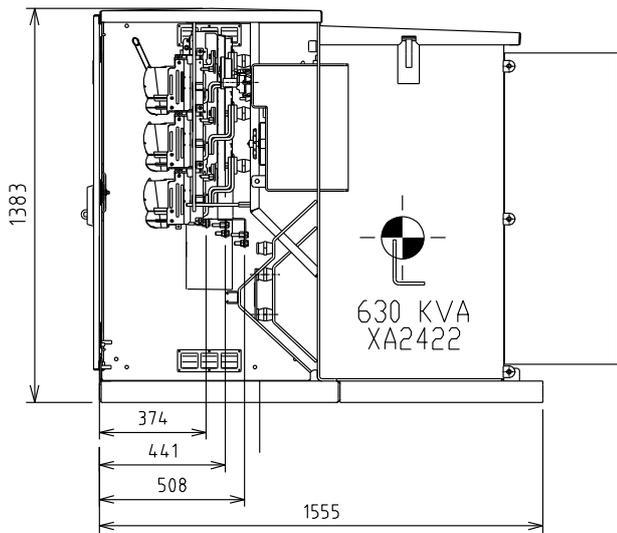
				TITLE TYREE 6/11, 22kV - 315 & 630kVA Mki MPS KIOSK SINGLE LINE DIAGRAM (NOW OBSOLETE)		DISTRIBUTION SUBSTATION MANUAL				
						DRAWN: GC DATE: 08/2019 DRG. No.		DSPM7-01		
						CHECKED: KG SCALE: NTS		REV. SHT		
						APPROVED: AS		A 1		
R. No.	DATE	DESCRIPTION	KGD	MS	CHD	APRD				

Uncontrolled document when printed
Refer to DM for current version

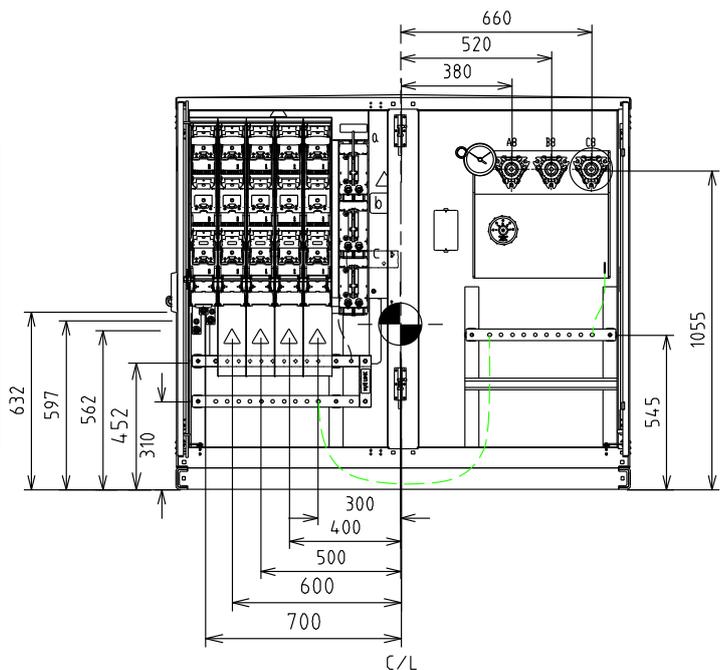


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PLAN



SIDE ELEVATION



FRONT ELEVATION

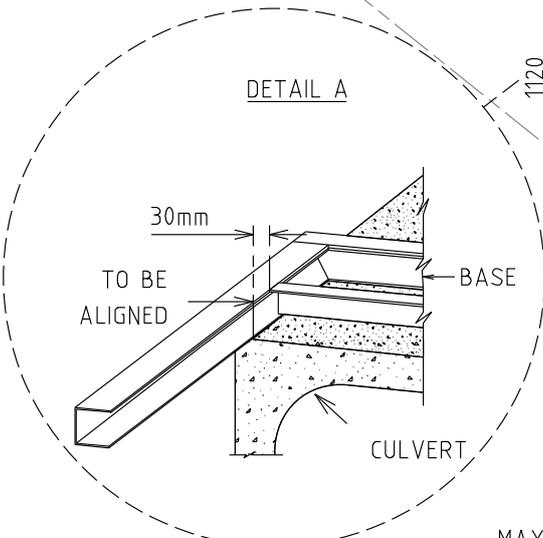
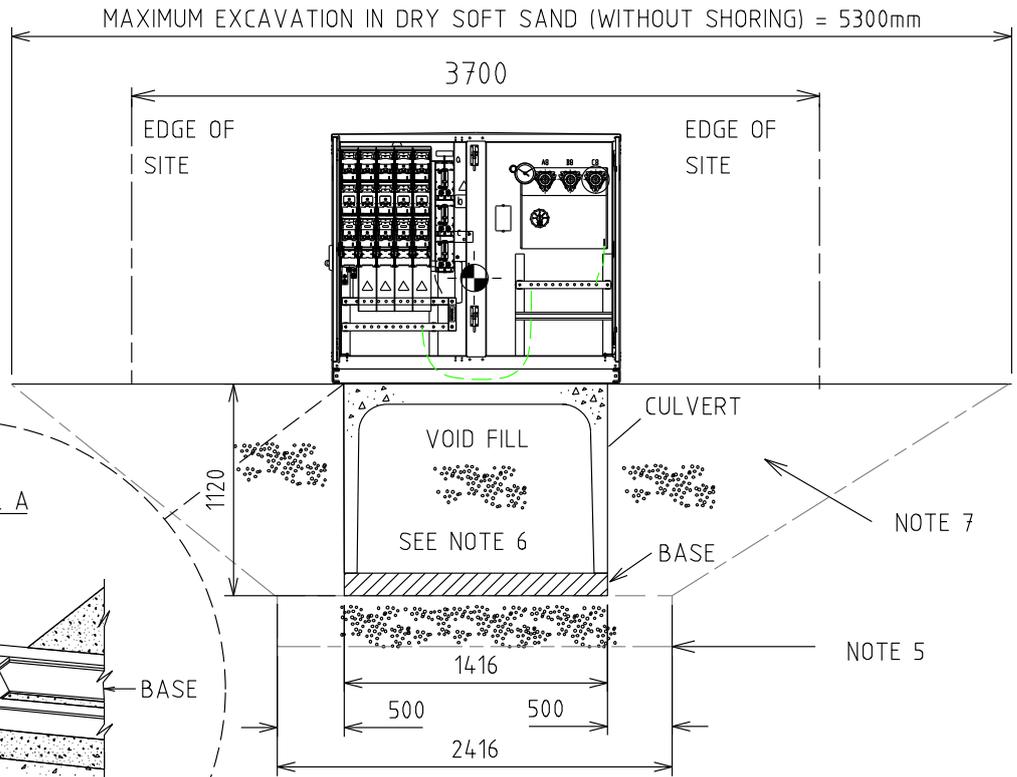
TRANSFORMER SIZE (KVA)	VOLTAGE (kV)	DIMENSION 'A' 'B'		OIL QTY (L)	WEIGHT (kg)	STOCK CODE	COMPATIBLE UNIT TRANSFORMER & LV CAB
315	6.6/11	2546	1478	635	2320	XA2414	HU61
315	22	2375	1463	535	2105	XA2420	HU61
630	6.6/11	2716	1756	855	3110	XA2416	HU61
630	22	2631	1551	715	2695	XA2422	HU61

R. No.				DATE				DESCRIPTION				CHGD.		APPRD.		TITLE TYREE 6/11, 22kV - 315 & 630kVA MkI MPS KIOSK GENERAL ARRANGEMENT (NOW OBSOLETE)				DISTRIBUTION SUBSTATION PLANT MANUAL				DRG. No. DSPM7-01	
C		05.08.18		NOW OBSOLETE, USE MkII MPS				KG		MS		DRAWN: GC		DATE: 08/2019		APPROVED: AS		SCALE: NTS		REV. C		SHT. 2			
B		31.01.18		OIL QTY ADDED				KG		MS		CHECKED: KG				APPROVED: MS									
A		05.10.17		TYREE TRANSFORMER ADDED				KG		MS															

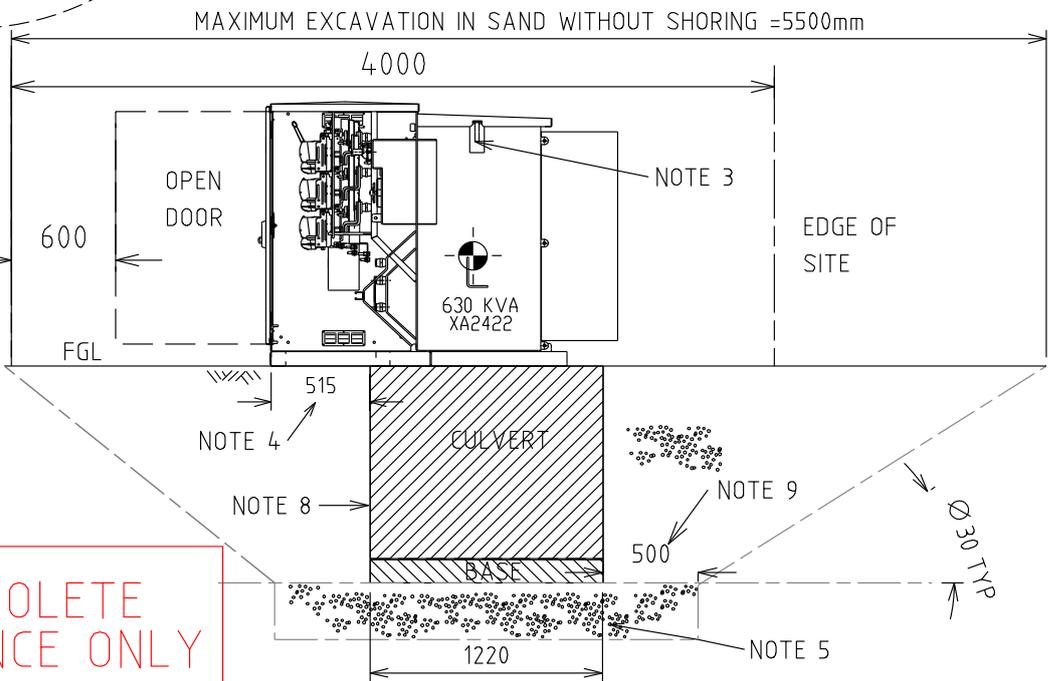
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FRONT VIEW



SIDE VIEW



NOW OBSOLETE FOR REFERENCE ONLY

THIS DRAWING TO BE READ IN CONJUNCTION WITH THE NOTES ON THE NEXT SHEET

R. No.	DATE	DESCRIPTION	CHEK	APPRD	TITLE	DISTRIBUTION SUBSTATION PLANT MANUAL		westernpower		
F	08/18	OBSOLETE. USE MKII MPS	KG	MS	TYREE 6/11, 22kV - 315 & 630kVA MPS KIOSK INSTALLATION GUIDE (NOW OBSOLETE)	DRAWN:	GC	DATE:	08/2019	
E	31.01.18	NOTES UPDATED AND DRAFT ISSUED FOR COMMENT	KG	MS		CHECKED:	KG	SCALE:	NTS	DRG. No.
D	05.10.17	TYREE TRANSFORMERS AND SHEET 3 ADDED	KG	MS		APPROVED:	AS	REV	E	SHT.
C	15.04.15	FORMAT CHANGED	YL	EJ		APPROVED:	MS			3
B	22.08.13	ORIGINAL ISSUE								

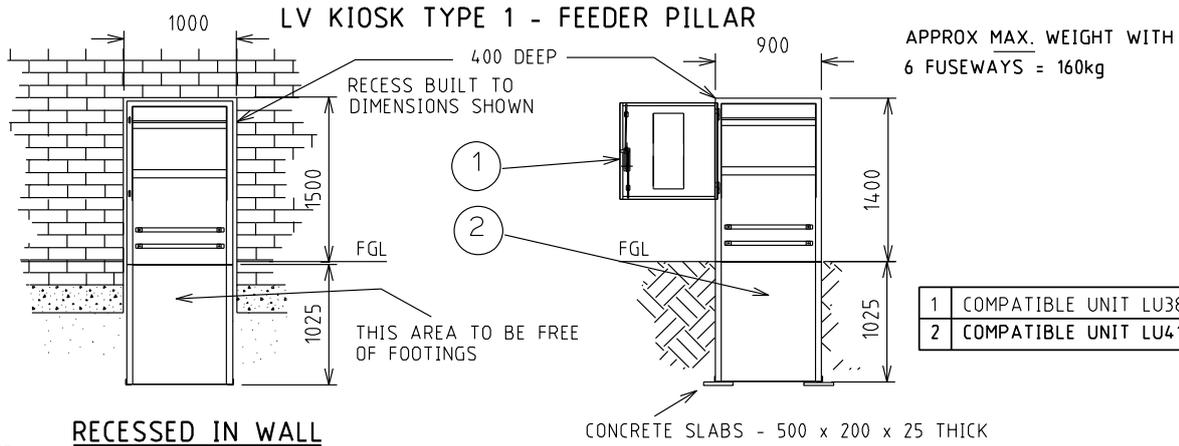
NOTES:

1. THE FOLLOWING IS TO BE READ IN CONJUNCTION WITH AS 3798 FOR EARTHWORKS, AS 4678 FOR EARTH RETAINING STRUCTURES AND AS 1597 FOR PRECAST CONCRETE CULVERTS.
2. EXCAVATION TO BE DONE IN ACCORDANCE WITH THE CODE OF PRACTICE FOR EXCAVATION.
A COMPETENT PERSON MUST BE PRESENT AT ALL TIMES DURING THE EXCAVATION, FOUNDATION PREPARATION, INSTALLATION OF CULVERT AND BACK FILL. IF DUE TO SITE CONDITIONS AND CLOSE PROXIMITY TO OTHER STRUCTURES SAFE EXCAVATION CANNOT BE CARRIED OUT THEN TRENCH SHORING SHOULD BE USED.
3. LIFTING POINT FOR "TRANSFORMER" TO BE USED FOR TRANSFORMER REPLACEMENT AND TO LIFT COMPLETE ASSEMBLED MPS UNIT. TRANSFORMER MUST LOWERED BE INTO PLACE FROM ABOVE WITHOUT ANY FORCE BEING APPLIED TO THE LV FRAME.
4. WHEN LANDING THE MPS TRANSFORMER THE EDGE OF THE CULVERT SHOULD BE LOCATED 30mm FROM THE FRONT EDGE OF MIDDLE CROSS MEMBER WITHIN THE MPS BASE. THIS IS 515mm FROM THE FRONT EDGE OF THE LV FRAME BASE. SEE DETAIL A.
5. COMPACTION OF SUBGRADE TO BE A MINIMUM MODIFIED DENSITY RATIO OF 95 % TO AS 1289.6.3.2 FOR A DEPTH OF 1000mm BELOW CULVERT BASE. IN CLEAN SAND THIS MAY BE MEASURED AS 10 BLOWS / 300mm WITH A STANDARD PENETROMETER.
6. VOID TO BE FILLED WITH SAND, HAND COMPACTION REQUIRED (NOT BY MACHINE).
7. COMPACTED BACKFILL MATERIAL IS TO BE CLEAN SAND. COMPACTION OF THE SAND IS TO BE CARRIED OUT IN LAYERS NOT EXCEEDING 300mm. COMPACTION LEVEL TO ACHIEVE A MINIMUM MODIFIED DENSITY RATIO OF 92 % TO AS 1289.6.3.2. THIS MAY BE MEASURED AS 8 BLOWS / 300mm WITH A STANDARD PENETROMETER
8. PRECAST REINFORCED BOX CULVERT AND BASE TO AS 1597 (100kN) STOCK CODE CA0002. NOMINAL (INTERNAL) SIZE OF CULVERT 1244 wide x 914 high x 1220 long. TO BE INSTALLED AS PER AS 1597.
EXTERNAL SIZE 1416 X 1022 X 1220
9. THE BASE OF THE EXCAVATION IS TO BE A MINIMUM OF 500 mm LARGER THAN THE BASE OF THE CULVERT, ON ALL SIDES. THE SIDES OF THE EXCAVATION ARE TO HAVE A SAFE SLOPE BASED ON SOIL TYPE AND MOISTURE CONTENT.
10. IN THE EVENT THAT THE SITE IS HIGHER THAN THE FINISHED LEVELS OF THE NEIGHBOURING AREAS, RETAINING WALLS, ACCESS STEPS AND DAINAGE SHALL BE PROVIDED COMPLYING WITH AS 4678, THE REQUIREMENTS OF THE LOCAL GOVERNMENT AUTHORITY AND WESTERN POWER. THIS WORK SHALL BE CERTIFIED BY A PROFESSIONAL CIVIL ENGINEER (NPER).
11. WHERE THERE IS A RISK OF FLOODING OR WHERE GROUND WATER EXISTS, THE SUBSTATION SITE SHALL BE ELEVATED AND RETAINED SO THAT THE CULVERT BASE IS ABOVE THE PREDICTED FLOODING OR HIGHEST POSSIBLE GROUND WATER LEVEL. THE FOUNDATION DESIGN, BACK FILL AND COMPACTION IS TO BE APPROVED BY A QUALIFIED GEOTECHNICAL ENGINEER.
12. A COMPACTION CERTIFICATE IN ACCORDANCE WITH as 1289.6.3.2 IS REQUIRED BY WESTERN POWER FOR ALL SUBSTATION INSTALLATIONS.

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						DISTRIBUTION SUBSTATION PLANT MANUAL	westernpower
TITLE						DRAWN: GC	DATE: 08/2019
TYREE 6/11, 22kV - 315 & 630kVA						CHECKED: KG	SCALE: NTS
MKI MPS KIOSK INSTALLATION						APPROVED: AS	DRG. No. DSPM7-01
GUIDE (NOW OBSOLETE)						APPROVED: MS	REV A SHT. 4
A	08/2019	NOW OBSOLETE, REFER MKII MPS	KG	MS			
R No	DATE	DESCRIPTION	CHEG.	APRD			

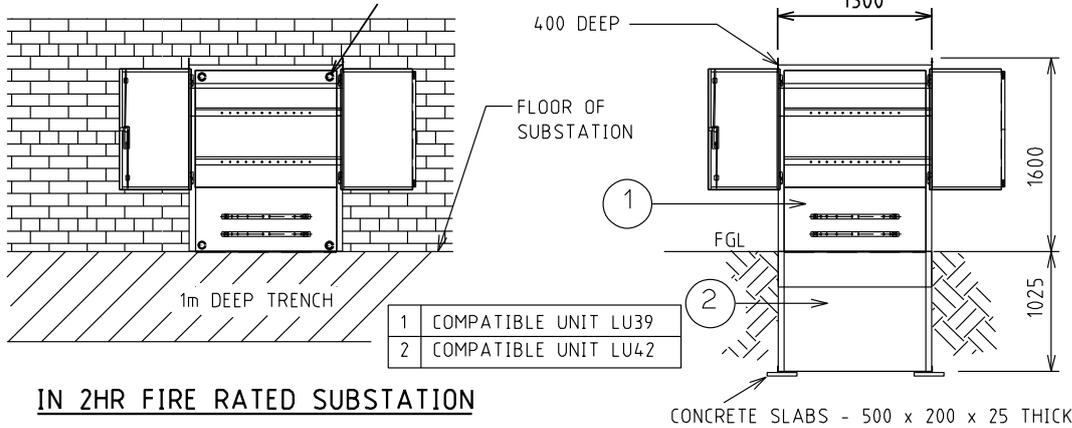
5.3 Type 1, 2 & 3 Low Voltage Switchgear Assemblies



NOTE:- THE CUSTOMER IS RESPONSIBLE FOR THE INSTALLATION OF THE WPC SUPPLIED FEEDER PILLAR, TO BE RECESSED IN THE WALL

LV KIOSK TYPE 2 - DISTRICT SUBSTATION

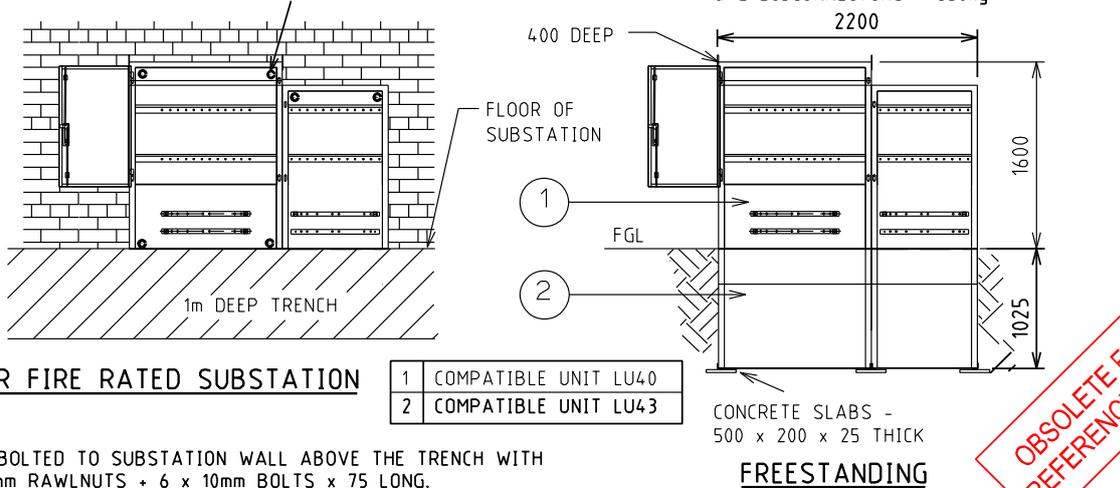
DRILL 4-HOLES 12 DIA. THRU REINFORCED SECTIONS.



NOTE:- KIOSK BOLTED TO SUBSTATION WALL ABOVE THE TRENCH WITH 4 x 10mm RAWLNUTS + 4 x 10mm BOLTS x 75 LONG.

LV KIOSK TYPE 3 - DISTRICT SUBSTATION

DRILL 6-HOLES 12 DIA. THRU REINFORCED POINTS AS SHOWN.



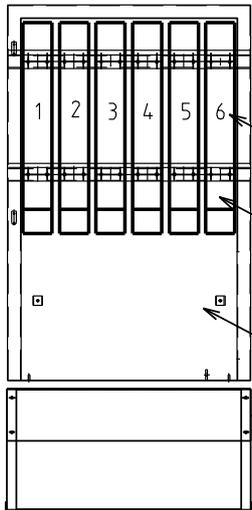
NOTE:- KIOSK BOLTED TO SUBSTATION WALL ABOVE THE TRENCH WITH 6 x 10mm RAWLNUTS + 6 x 10mm BOLTS x 75 LONG.

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R No	DATE	ORIGINAL ISSUE	DESCRIPTION	DRGD	CHEK	APRD
A	11/2019	ORIGINAL ISSUE				

TITLE	
LV SWITCHGEAR KIOSK GENERAL ARRANGEMENTS	

DISTRIBUTION SUBSTATION PLANT MANUAL			
DRAWN: JRR	DATE: 11/2019	DRG. No.	
ORIGINATED: GC	SCALE: NTS	DSPM-7-02	
CHECKED: CO		REV.	SHT.
APPROVED: GRANT STACY		A	1/2



LV KIOSK TYPE 1

COMPATIBLE UNIT LU38

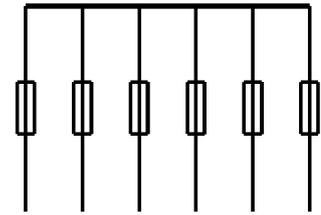
POSITION	1	2	3	4	5	6
LU44						

POSITION NUMBER

UP TO 6 - 400A FUSE-UNITS LU44

STANDARD FEEDER PILLAR FRAME

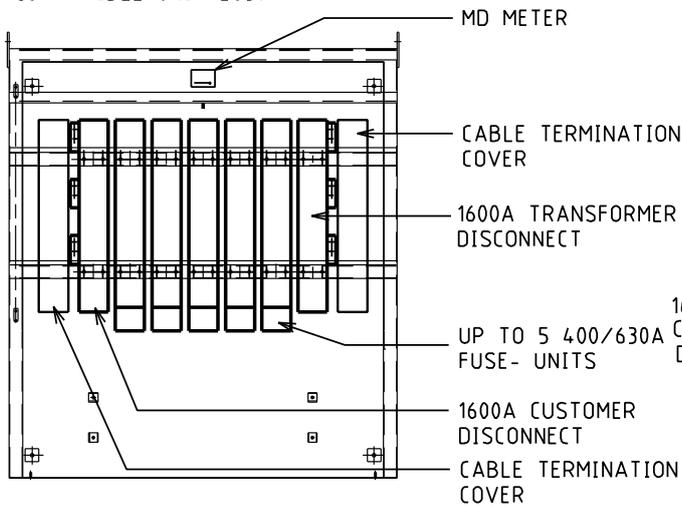
COMPATIBLE UNIT LU 41



UP TO 6-400A FUSE UNITS

LV KIOSK TYPE 2 - 160/315/500/630/1000kVA NON MPS

COMPATIBLE UNIT LU39

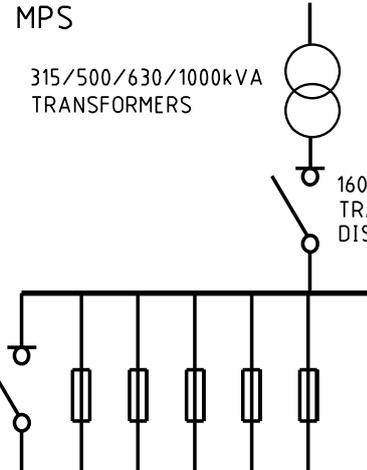


315/500/630/1000kVA TRANSFORMERS

1600A TRANSFORMER DISCONNECT

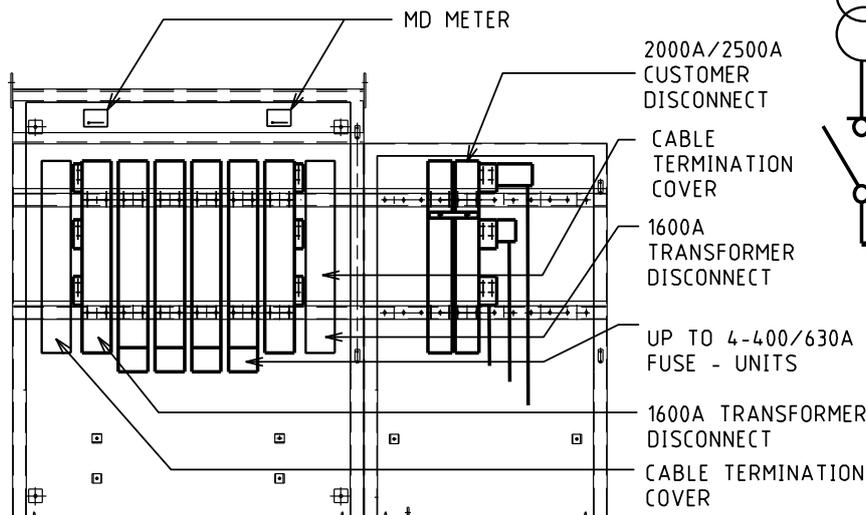
1600A CUSTOMER DISCONNECT

UP TO 5-400/630A FUSE - UNITS
OR
8-400/630A FUSE - UNITS
WITHOUT 1600A CUSTOMER DISCONNECT



LV KIOSK TYPE 3 - 2000kVA NON MPS

COMPATIBLE UNIT LU40

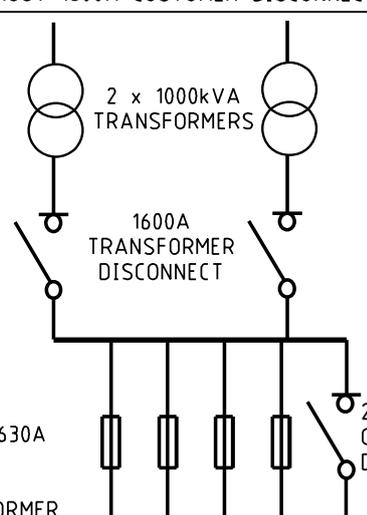


2 x 1000kVA TRANSFORMERS

1600A TRANSFORMER DISCONNECT

2000/2500A CUSTOMER DISCONNECT

UP TO 4-400/630A FUSE - UNITS



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TITLE				DISTRIBUTION SUBSTATION PLANT MANUAL		westernpower	
LV SWITCHGEAR KIOSK SWITCHBOARD CONFIGURATIONS				DRAWN: JRR	DATE: 11/2019	DRG. No.	
				ORIGINATED: GC	SCALE: NTS	DSPM-7-02	
A 11/2019 ORIGINAL ISSUE				CHECKED: CO	APPROVED: GRANT STACY	REV. A	SHT. 2/2
R. No.	DATE	DESCRIPTION	ORGO	CHEC	APRD		