

PROTECTION OF H-V OVER HEAD NETWORKS

11 KV / 22 KV FEEDERS

THESE FEEDERS WILL NORMALLY BE PROVIDED WITH THE FOLLOWINGS.

- 3 ϕ OVER CURRENT
- EARTH FAULT
- HIGH SET INSTANTANEOUS OVER CURRENT
- SENSITIVE EARTH FAULT
- EARTH FAULT INDICATOR.

RECLOSE WILL BE PROVIDED AT THE SOURCE SUBSTATION INITIATED

BY ALL PROTECTIONS OTHER THAN SENSITIVE EARTH FAULT.

THE RECLOSE WILL BE ONE RECLOSE ATTEMPT AFTER A NOMINAL
10 SEC DELAY AND THEN LOCK OUT.

RECLOSE WILL BE RENDERED NON OPERATIVE

- DURING SWITCHING BETWEEN FEEDERS
- DURING LINE WORK
- DURING TREE TRIMMING

- ON BUSH FIRE DESIGNATED FEEDERS ON THE
DAY OF FIRE DANGER

LINE RECLOSERS

POLE MOUNTED LINE RECLOSERS WILL BE USED
IN OVER HEAD LINE FEEDERS.

IT PROVIDES WITH PROTECTION, RECLOSING
AND REMOTE CONTROL (SCADA) FACILITIES.

33 KV, 66 KV, 132 KV FEEDERS

- DUPLICATE PROTECTION NEEDS TO BE PROVIDED.
- RELOCATION OF DISTANCE, PILOT WIRE, OVERCURRENT,
EARTH FAULT AND INTEGRAL TRIPPING RELAY.
- RECLOSING WILL NOT BE USED ON 33, 66, 132 KV
FEEDERS.

PROTECTION OF LOW VOLTAGE OVER HEAD NETWORKS (415V)

ALL 415V OVER HEAD BARE CONDUCTOR (OR) AERIAL BUNDLED CONDUCTORS (ABC) ARE TO BE PROTECTED BY CURRENT LIMITING HRC FUSES AT DISTRIBUTION SUB STATIONS.

FUSE

TS 4200 FUSE STANDARDS

TS 4208 STANDARD

MAXIMUM RATING OF OVER HEAD L.V NETWORK FUSE

400 Amp.

FAULT PROTECTION MAXIMUM CABLE LENGTH

FUSE SIZE	MAXIMUM LOOP IMPEDANCE FOR DISTRIBUTOR	MAXIMUM DISTRIBUTOR LENGTH
400A	$160 + j32 \text{ m}\Omega$	$1 \times 95 + 2 \times 95 \text{ mm} \quad 1 \times 150$ $200 \text{ m} \quad 400 \text{ m} \quad 300 \text{ m}$
200A	$280 + j55 \text{ m}\Omega$	$350 \text{ m} \quad 700 \text{ m} \quad 530 \text{ m}$
100A	$720 + j144 \text{ m}\Omega$	$900 \text{ m} \quad 1360 \text{ m}$

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INSULATION CO-ORDINATION AND OVER VOLTAGE PROTECTION

BASIC INSULATION LEVEL (BIL) FOR 11KV LINE

- OPEN WIRE LINE BIL 130 → 150 kV
- LINE SWITCHES AND FUSE 100 → 120 kV
- RECLOSERS 110 → 120 kV
- TRANSFORMERS AND SUBSTATION SWITCH GEARS 75 → 95 kV

* EVERY POLE SUBSTATION TO HAVE SURGE ARRESTERS AT
TRANSFORMER H.V TERMINALS.

* EVERY POLE SUBSTATION AND GROUND SUBSTATION TO HAVE
SURGE ARRESTERS AT TRANSFORMER TERMINALS (or) L.V
BUSBAR

* EVERY H.V UNDERGROUND TO OVER HEAD CONNECTION SHALL
HAVE SURGE ARRESTERS FITTED.

* ALL SURGE ARRESTERS must comply with AS1307 IN RESPECT
TO - 5 PART PERFORMANCE
- SHATTERING PERFORMANCE

- SURGE ARRESTERS ARE TO BE INSTALLED AT LINE RECLOSERS
- NO SURGE ARRESTERS ARE TO BE INSTALLED AT LINE SWITCHERS
(or) LINKS
- EARTHING SYSTEM must comply with NS0116.
- PIN INSULATORS ON TIMBER CROSS ARMS ARE NOT TO BE BONDED TOGETHER BECAUSE IT WILL REDUCE BIL

DESIGN PARAMETERS

ASSESSMENT OF MAXIMUM DEMAND . $\frac{VA}{sq.m}$

MAXIMUM L-U DISTRIBUTOR LOADING \rightarrow MUST NOT EXCEED 75% OF NOMINAL RATING

MAXIMUM VOLTAGE DROP - $\pm 6\%$ OF NORMAL 240V SUPPLY AT L-U

THE DESIGNED MAXIMUM VOLTAGE DROP IN L-U DISTRIBUTOR
MUST NOT EXCEED 9V AT EXTREMITIES WHEN THE DISTRIBUTOR
IS LOADED TO 75% OF NOMINAL RATING

VOLTAGE DROP IN SERVICE MAIN MUST NOT EXCEED 1% AT FULL LOAD

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QUALITY OF SUPPLY

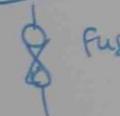
use of MIG FURNACES, WELDING MACHINES, FREQUENT START LARGE MOTORS, X RAY UNITS must comply with NSW SERVICE RULE

CLAUSE 9.3 TO 9.14

RELIABILITY

ALTERNATIVE SUPPLY TO L.V DISTRIBUTORS must BE PROVIDED FROM ADJACENT DISTRIBUTION CENTRE WHERE PRACTICABLE.

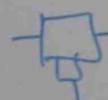
SYMBOLS



FUSE 11kV (OR) L.V



11kV RING MAIN



11kV RING MAIN
CIRCUIT BREAKER UNIT



TRANSFORMER 11kV / 415V

LOW VOLTAGE
LINK

b) LOW VOLTAGE
CIRCUIT BREAKER

CURRENT
TRANSFORMER

ISOLATING EARTHING
SWITCH (CITY SYSTEM)



3WAYS ISOLATING
EARTHING
SWITCH
(CITY SYSTEM)



CIRCUIT BREAKER



METERING UNIT.

ELECTRICAL CONTRACTINGSECTIONAL JOB SCHEDULE

JOB NAME —

DATE PREPARED —

JOB NUMBER —

BY —

MONTH	JAN				FEB			
WEEK	1	2	3	4	1	2	3	4
SECTION (1)	4	5						
SECTION (2)								
TOTAL								

SECTION (1) - SLAB, SITE, TEMP — Hours — WORKERS / WEEK

SECTION (2) - INTERIOR RACWAY — Hours — WORKERS / WEEK

SECTION (3) - DISTRIBUTION EQUIPMENT — Hours — WORKERS / WEEK

SECTION (4) - WIRE — Hours — WORKERS / WEEK

SECTION (5) - LIGHT FIXING — Hours — WORKERS / WEEK

SECTION (6) - TRIM — Hours — WORKERS / WEEK

SECTION (7) - FINISHING — Hours — WORKERS / WEEK

COMPOSITE SCHEDULE

DATE PREPARED

BY

MONTH	JAN				FEB			
WEEK	1	2	3	4	1	2	3	4

TOTAL NUMBER OF WORKERS NEEDED

CASH FLOW SCHEDULE

PREPARED BY

DATE

MONTH	JAN				FEB				MAR			
WEEK	1	2	3	4	1	2	3	4	1	2	3	4
\$ LABOUR												
\$ MATERIAL												
SUP TOTAL												
OVERHEAD												
TOTAL CASH NEEDED												

CASH FLOW SCHEDULE

MONTH	JAN				FEB			
WEEK	1	2	3	4	1	2	3	4
MONEY RECEIVED								
CASH FLOW + (or) -								
CUMULATIVE CASH FLOW + (or) -								

AVERAGE HOURLY LABOUR RATE
\$ —

MATERIAL / LABOUR RATIO =

AVERAGE OVERHEAD %

AVERAGE PROFIT —

CASH FLOW SCHEDULE

mon TH WEEK	JAN				FEB			
	1	2	3	4	1	2	3	4
MONEY RECEIVED								
CASH FLOW + (ore) -								
CUMULATIVE CASH FLOW + (ore) -								

AVERAGE Hourly LABOUR RATE \$ —

MATERIAL / LABOUR RATIO =

AVERAGE OVERHEAD % —

AVERAGE PROFIT —

% AVERAGE RETAINING

$$\text{LABOUR \$} = \frac{\text{WORKERS}}{\text{WEEK}} \times 40 \times \text{AVERAGE RATE}$$

$$\text{MATERIAL \$} = \text{LABOUR \$} \times \text{RATIO} \quad (\text{ENTER 2 WEEKS AFTER LABOUR \$})$$

$$\text{OVER HEAD} = \text{SUB TOTAL} \times \text{AVERAGE \% OF OVERHEAD}$$

$$\text{CASH NEEDED} = \text{OVER HEAD} + \text{SUB TOTAL}$$

$$\text{MONEY RECEIVED} = \frac{\text{TOTAL CASH} + \text{PROFIT} - \text{AVERAGE NEEDED}}{\text{RETAINING}}$$

(ENTER 4 WEEKS AFTER CASH NEEDED)

OFFICE MANAGEMENT AND RESPONSIBILITIES

SCHEDULE

OWNER

MON - FRIDAY

AM - ASSIST SUPERINTENDENT (OR) OTHERS IN
GETTING THE DAY STARTED
SEE TO IT THAT EVERY BODY IS WORKING
AND HAPPY

OTHER ACTIVITIES

PM - MAKE SURE THAT EVERY ONE IS GETTING THEIR
WORK DONE

OTHER ACTIVITIES

SATURDAY -

AM - REVIEW ALL JOBS

GENERAL REVIEW AND PLANNING

PM - OTHER ACTIVITIES

ESTIMATOR

MONDAY - THURSDAY

AM - PLAN THE DAY'S WORK. ASSIST SUPERINTENDENT (OR) OTHERS AS
REQUIRED TO GET THEM STARTED
SEE SALESMEN ETC FROM 8:30 → 9:30 AM
PREPARE ESTIMATES. BID JOBS, PLAN JOBS ETC

PM - PREPARE ESTIMATES ETC
TALK TO SALES PERSONS, SUPERINTENDENT ETC AS
REQUIRED FROM 4 PM UNTIL END OF THE DAY.
TAKE CARE OF ANY MESSAGES ON CLIP BOARD

FRIDAY

AM - REVIEW ALL JOBS WITH SUPERINTENDENT.
CHECK INVOICES, PURCHASE ORDERS, JOB ACCOUNTINGS
ETC. PREPARE BILLING, CHANGE ORDERS ETC.
RETURN APPROVED INVOICES TO BOOKKEEPERS FOR
PAYMENT. RETURN JOB FOLDERS TO BOOKKEEPERS.
GIVE BILLING INFORMATION TO BOOKKEEPERS (OR) SECRETARY
FOR PREPARATION

PM - PREPARE ESTIMATES. SEE SALESMEN AS REQUIRED. TAKE CARE
OF MESSAGES

SATURDAY - AS REQUIRED

SUPERINTENDENT

MONDAY - THURSDAY

AM - GET EVERY ONE GOING, WORK OUT ANY PROBLEMS WITH SCHEDULING
(OR) MATERIALS. SUPERINTENDENT SHOULD BE THE FIRST PERSON AT
THE OFFICE IN THE MORNING PREFERABLY ONE HOUR BEFORE
ANY ONE ELSE. VISIT JOB SITES. CO-ORDINATE WITH FOREMAN.

INSPECTORS, ARCHITECTS, ENGINEERS ETC

PM - PREPARE ANY CHANGE ORDERS, CORRESPONDENCES, ORDERS, SCHEDULES
BILLINGS, ESTIMATES ETC
VISIT JOB SITES OTHER ACTIVITIES AS REQUIRED

FRIDAY

AM - REVIEW ALL JOBS WITH ESTIMATOR. CHECK INVOICES, PURCHASE ORDERS,
JOB ACCOUNTING. PREPARE CHANGE ORDERS, BILLING ETC
PM - VISIT ALL JOB SITES (OR) OTHER ACTIVITIES AS REQUIRED

SATURDAY - AS REQUIRED

BOOKKEEPER

MONDAY

MAKE WEEKLY MATERIAL. UPDATE TOPCARD

TUESDAY

PREPARE ACCOUNT PAYABLE. ISSUE CHARGES

WEDNESDAY

PREPARE WEEKLY PAY ROLL

THURSDAY

MAKE WEEKLY LABOUR UPDATE TO JOB ACCOUNTING.
PREPARE INVOICE AND JOB FOLDERS

FRIDAY

PREPARE BILLING. TAKE CARE OF COLLECTIONS

SATURDAY - AS REQUIRED

SUPERINTENDENT

MONDAY - THURSDAY

AM - GET EVERY ONE GOING, WORK OUT ANY PROBLEMS WITH SCHEDULING
(OR) MATERIALS. SUPERINTENDENT SHOULD BE THE FIRST PERSON AT
THE OFFICE IN THE MORNING PREFERABLY ONE HOUR BEFORE
ANY ONE ELSE. VISIT JOB SITES. CO-ORDINATE WITH FOREMAN.
INSPECTORS, ARCHITECTS, ENGINEERS ETC

PM - PREPARE ANY CHANGE ORDERS, CORRESPONDENCES, ORDERS, SCHEDULES
BILLINGS, ESTIMATES ETC
VISIT JOB SITES OTHER ACTIVITIES AS REQUIRED

FRIDAY

AM - REVIEW ALL JOBS WITH ESTIMATOR. CHECK INVOICES, PURCHASE ORDERS,
JOB ACCOUNTING. PREPARE CHANGE ORDERS, BILLING GTC
PM - VISIT ALL JOB SITES (OR) OTHER ACTIVITIES AS REQUIRED

SATURDAY - AS REQUIRED

BOOKKEEPER

MONDAY

MAKE WEEKLY MATERIAL. UPDATE TOPCARD

TUESDAY

PREPARE ACCOUNT PAYABLE. ISSUE CHEQUES

WEDNESDAY

PREPARE WEEKLY PAYROLL

THURSDAY

MAKE WEEKLY LABOUR UPDATE TO JOB ACCOUNTANT.
PREPARE INVOICE AND JOB FOLDERS

FRIDAY

PREPARE BILLING. TAKE CARE OF COLLECTIONS

SECRETARY

TOPCARD