

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.

RECLOSING WILL BE PROVIDED AT THE SOURCE SUBSTATION INITIATED

BY ALL PROTECTIONS OTHER THAN SENSITIVE EARTH FAULT.

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

RECLOSING 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, OVER CURRENT, EARTH FAULT AND INTER 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 SUBSTATIONS.

FUSE TS 4200 FUSE STANDARDS

TS 4208 STANDARD

MAXIMUM RATING OF OVER HEAD L.V NETWORK FUSE
400 AMP.

FUSE SIZE	MAXIMUM LOOP IMPEDANCE FOR DISTRIBUTOR	CABLE LENGTH		
		MAXIMUM DISTRIBUTOR LENGTH		
		1x95 mm	2x95	1x150
400A	$160 + j32 \text{ m}\Omega$	200m	400m	300m
200A	$280 + j56 \text{ m}\Omega$	350m	700m	530m
100A	$720 + j144 \text{ m}\Omega$	900m		1360m

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 AS/307 IN RESPECT TO -
- SPARK 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 IS 0116.
- PIN INSULATORS ON TIMBER CROSS ARMS ARE NOT TO BE BONDED TOGETHER BECAUSE IT WILL REDUCE BIL

DESIGN PARAMETERS

ASSESSMENT OF MAXIMUM DEMAND $\cdot \frac{VA}{\sqrt{3} \times V_m}$

MAXIMUM L.V DISTRIBUTOR LOADING \rightarrow MUST NOT EXCEED 75% OF NOMINAL RATING

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

THE DESIGNED MAXIMUM VOLTAGE DROP IN L.V 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


QUALITY OF SUPPLY


USE OF ARC FURNACES, WELDING MACHINES, FREQUENT START LARGE MOTORS, X RAY UNITS MUST COMPLY WITH NSW SERVICE RULE CLAUSE 9.8 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 FUSE SWITCH UNIT


 11KV RING MAIN CIRCUIT BREAKER UNIT


 TRANSFORMER 11KV/415V


 LOW VOLTAGE LINE


 LOW VOLTAGE CIRCUIT BREAKER

 CURRENT TRANSFORMER

 ISOLATING EARTHING SWITCH (CITY SYSTEM)

 3WAYS ISOLATING EARTHING SWITCH (CITY SYSTEM)

 CIRCUIT BREAKER

 METERING UNIT.

ELECTRICAL CONTRACTING

SECTIONAL 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 RACEWAY _____ 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												
SUB 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

MONTH WEEK	JAN				FEB			
	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 —

% AVERAGE RETAINING

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

$$\text{MATERIAL \$} = \text{LABOUR \$} \times \text{RATIO} \quad \left(\begin{array}{l} \text{ENTER} \\ \text{2 WEEK} \\ \text{AFTER LA} \end{array} \right) \text{BOUR \$}$$

$$\text{OVER HEAD} = \text{SUB TOTAL} \times \frac{\text{AVERAGE \% OF OVERHEAD}}{100}$$

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

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

(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 EVERYONE 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 JOB CARD

TUESDAY

PREPARE ACCOUNT PAYABLE. ISSUE CHEQUES

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

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