



GOVERNMENT OF TELANGANA MISSION BHAGIRATHA DEPARTMENT



***Workshop on Operation & Maintenance of Substations, Transformers and
Motor pumpsets dated on 20.02.2023.***

***PRESENTED BY
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Consultant,Electrical
Mission Bhageeratha Dept.***

Power supply Arrangements:

The power supply is provided by TS TRANSCO, TSSPDCL & TSNPDCL to the various pumping stations under Mission Bhagiratha.

- I. 220KV/11KV Sub Stations - 2Nos.
- II. 33KV/11KV Sub Stations - 41Nos.
- III. HT services and LT services
 - All HT service pumping stations are provided with 2 incoming sources. One is dedicated and other one is stand by.
 - All the PTRs/DTRs shall keep in service constantly (working + standby)

33/11KV Substation



The Operation and Maintenance envisages all required tasks to ensure :

- Maximum system availability
- Most efficient effective and optimum usage of electrical system
- Enhance the life expectancy of equipment
- Preventive maintenance/Scheduled maintenance
- Maintaining reliable and uninterrupted power supply

The PTR is the main equipment erected with a complete protective system comprising of the following:

- 1. 33KV&11KV Circuit Breakers(VCBs)
- 2. Protective Relays
- 3. Metering Equipments
- 4. 33KV&11KV Lightening Arrestors
- 5. AB switches/Isolators
- 6. Insulators
- 7. Bus bars
- 8. Capacitor banks
- 9. Control Panels
- 10. Earthing
- 11. Fencing
- 12. Battery and Battery chargers
- 13. 33KV&11KV CTs and PTs



Lightning Arrester



AB SWITCH

- Lightening Arrestor is a most important protective devise of a Transformer to protect valuabe as well as working personnel.
- AB switch is a manual operated isolator.
- VCB is a automatic operated isolator.

The most prominent cause of failure of PTR/DTR is due to

1.Overloading

2.failure of Protective system.

3.Lack of maintenance

Hence it is necessary to carry out scheduled maintenance of all equipments.



TEJASWINI

Substation Yard improvements viz removing of vegetations and cleaning of yard, necessary earth fillings with metal spreading at top and fencing are to be carried out as per CEIG norms.



- Checking the switch yard at periodical intervals and attend to any unusual observations, defects, sparks, loose contacts, red hot spots and loose bolts and nuts etc and intimate to the maintenance in-charge of engineer immediately.
- Checking protection and control circuits of each equipment monthly
- Check control and relay panels are good condition or not.
- Check healthy trip circuit



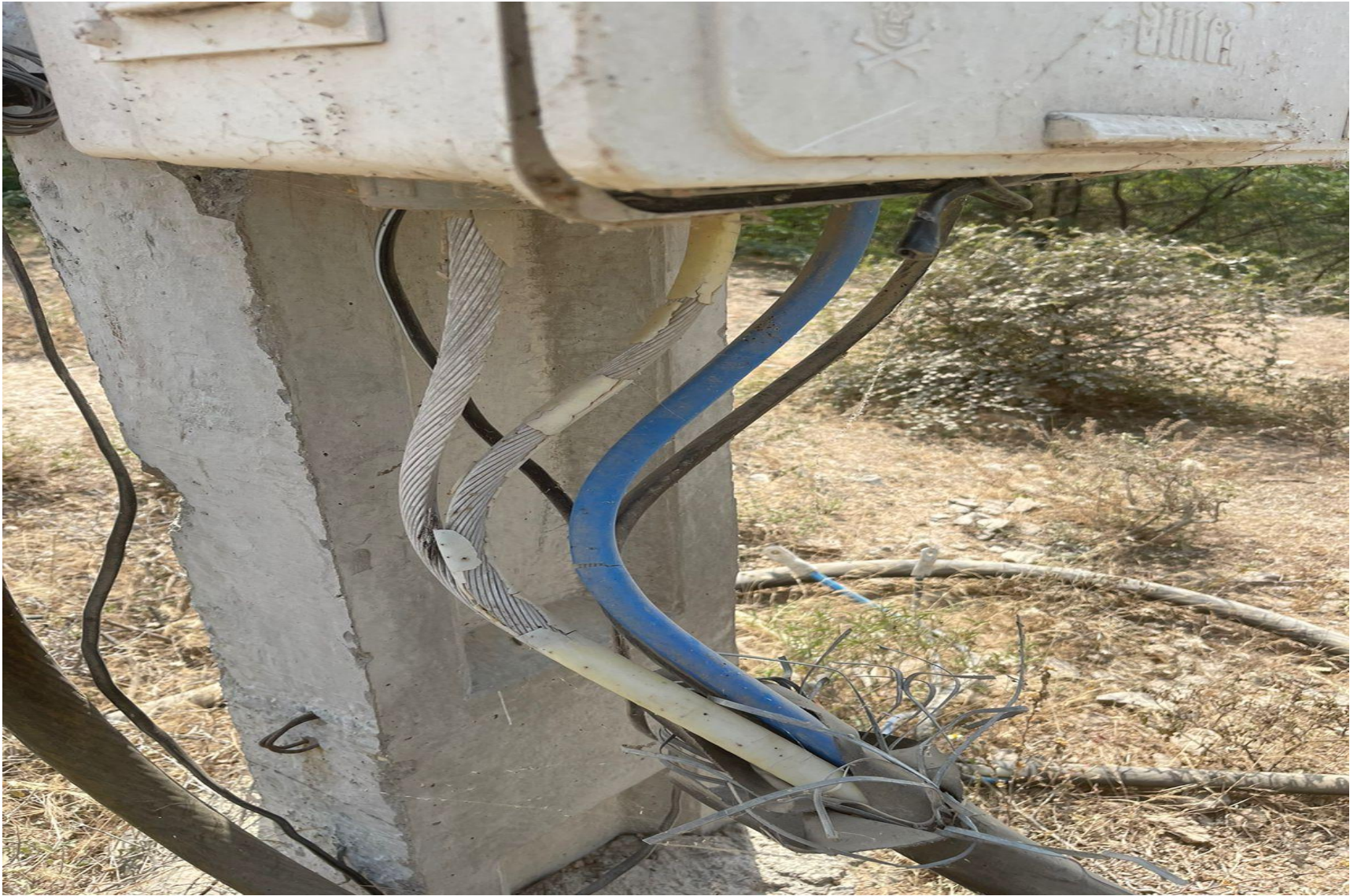
- Check cable lugs/Terminal points of the electrical panels, switches, starters, indication lamps, contactors, switch gear etc and replace whenever requires.
- Inspection of Batteries, Battery charger and other controls, voltage, specific gravity of batteries.
- Check oil leakages at joints/bushings/drain valve and oil levels in the Transformer Tank top up if required.
- Check Oil BDV(Break Down Voltage).
If $BDV < 30KV/cm$, do Filtration to restore quality.
- Primary Function of Oil is to insulate and to cool the Transformer.
- Check abnormal noise at Transformers
- Check blowing of fuses/tripping of circuit breaker.



- Check frequent change of silica gel colour in the dehydrating breather of Transformer.
(Change if it is in Pink colour)



- Check of Overheating of cable ends/ terminals and Provide cable end kits at the Transformer secondary side as cable insulation may damage due to weather conditions.





- Maintenance of earthing system-Checking the joints and continuity of earth conductors visually. The earthing is to be improved by regular watering to the earth pits.

Earthing



Grounding



Vs

Difference between Earthing and Grounding

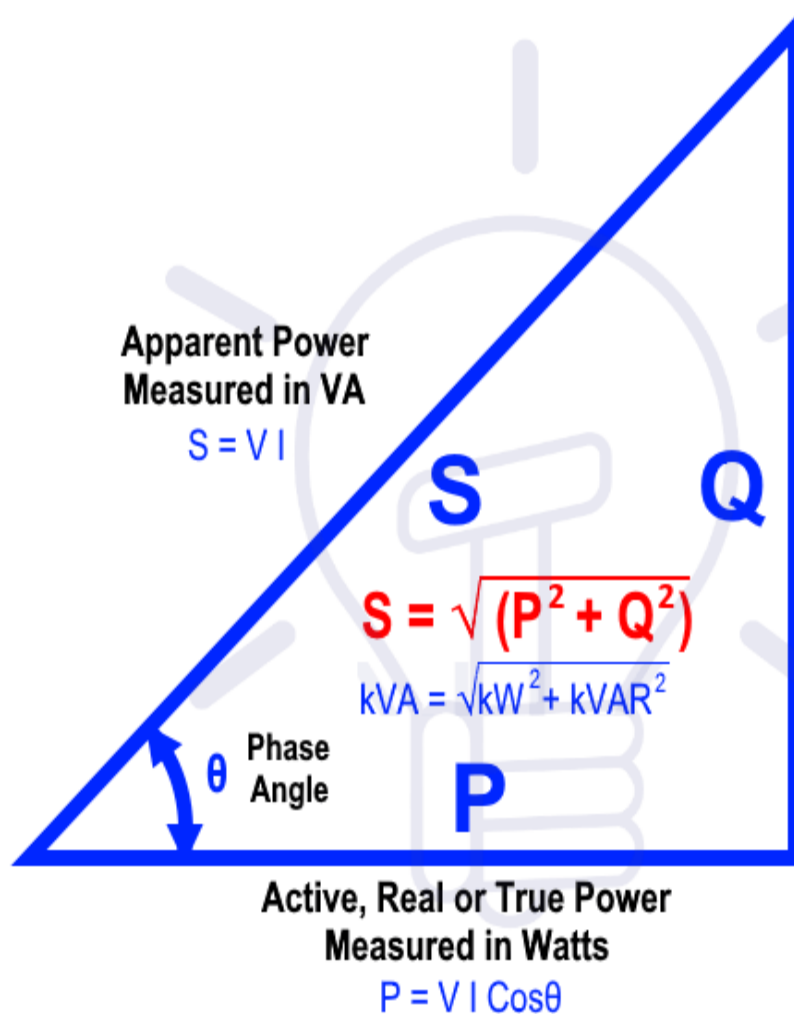
- The load sharing shall be done on both the feeders and Transformers.
(working + standby)

PUMP HOUSE

- All the pump sets shall work in a cyclic manner and all the pumps (working+standby) shall keep in running condition.
- Disposal of accumulated leakage water by Dewatering pumps regularly.
- The Pump room shall be kept in dry.
- The instrumentation viz level sensor, flow meter and pressure monitor may be monitored to meet the Standard Operating Procedure(SOP) requirements.

- The Noise level and Vibration is to be reduced as per the standards.
- Motor bearings shall be checked and greasing regularly whenever required.
- The Internal and External illumination shall be improved.
- The capacitor banks shall be checked visually for flash /spark marks of all connections regularly and the Power factor is to be improved to 0.98 and above.

Power Triangle & Power Factor



$$P = VI \cos \theta$$

$$\cos \theta = \frac{P}{VI}$$

$$\cos \theta = \frac{kW}{kVA}$$

$$\cos \theta = \frac{\text{True Power}}{\text{Apparent Power}}$$

$$\cos \theta = \frac{R}{Z}$$

$$\cos \theta = \frac{kW}{kVA} = \text{Power Factor}$$

$$\text{Power Factor} = \frac{\text{Active Power}}{\text{Reactive Power}}$$

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- Check Main MCC Panel, measuring devices, Cable Termination and Glands from main panel to all the equipments and sub LT panels.
- Check all the motors and their cable connections at
 - Flash mixer motors
 - Clariflocculator motors
 - Bridge Motors and
 - Sludge Motors
 - Chemical House
 - Chlorine House
 - Filter House and
 - Recycling Pumps
- Generator set shall be provided for Emergency Lighting at Filter House.

- Check all the connection of cables, wires, jumpers and bus bars should be intact.
- Bus bar: An assembly of conductors for collecting electrical power and distributing them to outgoing feeders.
- Calibrate all the vital instruments i.e., Ammeter, voltage, multifunction meter, pressure gauge, flow meter, Ultrasonic Level sensor etc protection relay for functioning and relay settings in the panel board.
- Shock proof rubber matting shall be provided in front of panel Board as per CEIG norms.
- Conduct Performance test of pump sets for discharge and efficiency regularly.
- Periodical checking and maintenance of EOT/HOT cranes should be done.

- The standard log book is to be maintained properly and record all the parameters like current, voltage, PF, connected load, pressure and discharge on hourly, monthly basis through various meters regularly.
- Regular training shall be given to the O&M staff to improve the efficiency.
- The standard spare parts are to be provided at pump house to meet the emergencies and to avoid interruption of water supply.

- The house keeping in the pumping station is to be improved as per the CEIG norms.
- Keep all the Electro Mechanical equipments neat and clean condition.
- Periodical inspection fee is to be remitted to the Electrical inspectorate authorities for renewal to the installation approvals.
- History sheets of all the Electro mechanical Equipments shall be maintained.

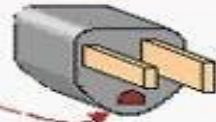
- The safety devices viz fire extinguishers, Hand gloves, Earth discharge rods, Tool Kit, Torch, Danger notice Boards, Shock Treatment chart and fire buckets with stands are to be provided as per CEIG norms and follow the safety precautions as per standards.
- Scheduled and Periodical maintenance should be followed invariably hourly, daily, weekly, monthly, quarterly and yearly.

ELECTRICAL SHOCK

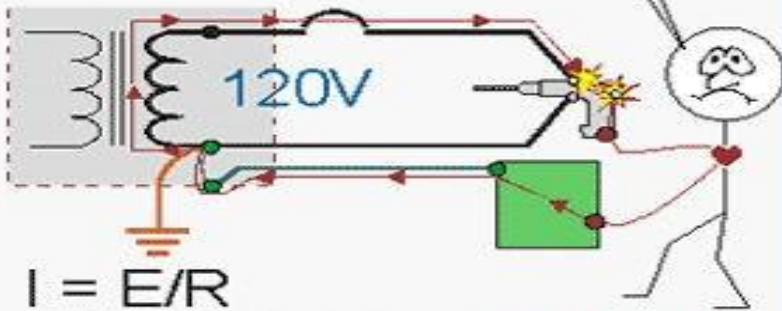
Electrical Shock

The body becomes part of an electrical path.

Broken Terminal



1000 Ohms



$$I = E/R$$
$$120V/1000\Omega = 120 \text{ mA}$$

Line-to-ground fault energizes metal parts.

Grounded Object or Surface

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SOUTHERN POWER DISTRIBUTION COMPANY OF TS LIMITED

H.T C.C. Bill for the Month of November 2022,

Date: 26-Nov-22

PAYABLE ON OR BEFORE Dated : 10-Dec-22

DISCONNECTION DATE: 25-Dec-22

Contracted MD (KVA/HP)	1800	Consumer Number	VKB2066
Specified Voltage(KV)	33	Name	EXCUTIVE ENGINEER RWS&S(TDWSF)
Actual Voltage(KV)	33	Address1	-
Feeder	175112160105 (DF)	Address2	RAGHAVAPUR
Category	4B	Address3	RAGHAVAPUR

DESCRIPTIONS	KWH	KVAH	KVA	TOD1	TOD2
Reading On 19-NOV-22	10082.18	10806.82	0.40	1859.57	1775.90
Reading On 20-OCT-22	9840.78	10548.22		1816.70	1733.71
Difference ST-01	241.4	258.6		42.87	42.19
Multiplying Factor	4000	4000	4000	4000	4000
Total Consumption	965600	1034400	1596	0	0
Monthly Minimum Units	0		1440		
Main Consumption	1034400		0		0
		Colony		L&F	

DESCRIPTIONS	RATE	KVA/UNITS	AMOUNT Rs.
Demand Charges Normal	Rs. 0	1596	0.00
Demand Charges Penal	Rs. 0	0	0.00
Energy Charges	Ps. 610	1034400	6309840.00
Incentive TOD1	(FR: 2627.63 IR: 2562.58)		0.00
Incentive TOD2	(FR: 899.12 IR: 877.16)		0.00
TOD Charges	Ps. 0	0	0.00
Electricity Duty	Ps. 6	1034400	62064.00
Colony Charges	Ps. 0	0	0.00
L&F Charges	Ps. 610	0	0.00
Green Energy Charges	Ps. 0	0	0.00
FSA Charges	Ps.		

Supplier Name	Net KWH	KVA	TOD
Arrears as on 23/11/22			
	C.C.Charge	TCS on Arrears	
Court Case Rs.	0		
Others Rs.	192825412		0.00
Total Rs.	192825412		

Sub Total	6371904.00
Customer Charges	3500.00
ACD Surcharge	150786.00
UE Charges	0.00
Cross Subsidy Surcharge	0.00
Additional Surcharge on OA	0.00
RKVAH surcharge HYDEL	
RKVAH surcharge WIND	
Late Payment Charges	1253615.97
Interest on ED	22978.03
Penal Interest	
Difference Voltage Surcharge	0.00
Wheeling Charges	0.00
Transmission Charges	0.00
Other Charges-I	0.00
Other Charges-II	0.00
Gross Total	7802784.00
Inc. Rec. from Govt.	0.00
IT TCS U/s 206C(1H)	0.00
Net Bill Amount	7802784.00
Total Arrears	192825412.00
Total Amount Payable	200628196.00

THANK YOU