THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA

ETHIOPIAN ELECTRICITY AGENCY

TECHNICAL INSPECTION GUIDELINE

SECOND REVISION

ADDIS ABABA

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1. INTRODUCTION

Any electricity company (utility) is responsible for maintaining safe and reliable electrical service to its customers. These issues are clearly stated in the following articles of the Electricity Operations Council of Ministers Regulations No. 49/1999.

"Licensees shall have the following obligations:

- to take proper measures in order to protect human life, property and the environment
- to supply electricity to customers on regular basis" Articles 23.2 and 23.3

Safety and availability of supply is very essential for safeguarding the national investment to ensure:

- public confidence in the continued accrual of benefits from these investments;
- reliability of supply.

The Electricity Proclamation 86/1997 empowers the Agency by stipulating:

- "The Agency shall have the powers and duties to supervise and ensure that the generation, transmission, distribution and sale of electricity are carried out in accordance with this Proclamation as well as regulations and directives issued hereunder" -Article 6.1
- "An official duly authorized by the Agency may at all reasonable times enter premises and inspect and supervise generation, transmission, distribution and sale of electricity without unreasonably impeding or obstructing activities thereof" - Article 19

In this regard, this document provides:

1. guidelines for the inspection and evaluation by the Agency's inspectors to determine the safety, reliability of supply and customer services of Licensees.
2. principal factors to be weighted in the determination of existing or potential safety, reliability and customer service issues and define the scope and range of activities to be undertaken in the process of inspection.

The guideline apply to all Licensees those who generate, transmit, distribute and sale electric power for commercial purpose.

2. GENERAL SCOPE

The scope of this guideline is limited to assess the technical and managerial adequacy of the Licensees activities with regard to safety, reliability of supply and customer services.

Therefore, this guideline presents only procedures for investigating and evaluating existing conditions and assesses potential areas for efficiency improvement.

3. OBJECTIVES OF TECHNICAL INSPECTION

1. to verify that operation procedures are in place, understood by concerned staff, reviewed and approved in accordance with the regulatory requirements and the license terms and conditions;
2. to evaluate the effectiveness of the Licensees process for identifying, resolving and preventing issues that degrade the safety, and reliability of supply and customer services;
3. to verify that the Licensee's procedures are designed such that they are transparent, technically adequate and consistent, stable and hence predictable to comply with regulatory requirements.

4. PRE-INSPECTION REQUIREMENTS

4.1 Planning and Preparation

Proper planning and preparations are important components of the inspection process. Prior to conducting inspections, the inspector shall:

- select target areas to be inspected (generation, transmission, distribution and sales of electricity);
- select items/networks to be inspected (this could be plant substation, transmission line towers and conductors, transformers, customer handling procedures, etc);
- select the inspection process (this could be procedures and document review or visual observation on safety, reliability and customer service issues);
- prepare detailed checklist based on the selected item to be inspected;
- prepare schedule of the inspection including individual assignments and other resource arrangements.

4.2 Documents

Documents to be reviewed by the inspector may include

- Regulations, directives and standards applied in the system design and implementation;
- diagrams and technical description of the selected network and its components
- descriptions of the operation and maintenance of the system
- manufacturers' manuals of various equipment

- customer service policy and procedures, customer charter and electricity supply contract models
- license obligations and other regulatory commitments

4.3 Entrance Meeting

Prior to the inspection, the inspector shall read and become familiar with the Licensee's report of the selected items to be inspected. To be familiarized more with the selected items, the Licensee could be requested to arrange an entrance meeting at his office. The objective of this meeting is for the inspector to get acquainted with the following general matters.

- The overall organization
- Communication and reporting procedures
- Activities planning
- Procedures
- Constraints
- Records of unsolved problems, etc,

This shall facilitate and support the inspector to evaluate effectiveness, consistency, stability and hence predictability of Licensee's process to identify, resolve and prevent problems with minimum possible cost.

5. TYPE OF INSPECTION

During the inspection, the team shall perform a review of the activities of a Licensee generally or for selected samples as appropriate for conformance with regulatory requirements and safety, reliability, and quality of service standards. The inspection process may comprise, as the case necessitates, office inspection and/or site inspection.

5.1 Office Inspection

Office inspection consists of reviews of working documents and the gathering of data with the aim of verifying compliance with regulatory requirements. The team should utilize performance-based approach to prepare for and conduct the inspection. During office inspection the team may place special emphasis on identifying potential problems in Licensee controls for identification, evaluation, resolution, and prevention of problems. The team may selectively perform the following tasks:

- verify that there is an adequate documentation and record keeping system;
- review any self-assessment programs and reports conducted by the Licensee, placing special emphasis on the conclusions and corrective actions;

- obtain, through discussion and inspection report, and review the Licensee's inspector's assessment of strengths and weaknesses (if any);
- obtain the Licensee's administrative procedures that control the identification, evaluation, and resolution of problems. Also obtain the Licensee's procedures and practices for self-assessment. Selected Licensee's documents needed to support the inspection may be obtained during a pre-inspection trip to the site or requested to be available when the inspectors arrive on site;
- obtain and review procedures and documentation on the Licensee's efforts to identify, resolve and prevent system and component performance problems through performance monitoring, root cause analysis, cause determination and corrective actions;
- conduct document review and collect any information or data that is appropriate for the assignment from working documents, logbooks, work orders, maintenance requests, reports, files, etc of the Licensee;
- check that appropriate action has been taken by the Licensee to rectify any problems that arose at previous inspections. Obviously, in cases of serious problems, action would needed to have been taken immediately following the last inspection;
- check that the Licensee is keeping a record of its inspections as required under Regulations;
- obtain and review other documents that would be valuable for the in-office review, such as a list of corrective action documents issued from the time of the last inspection of the corrective action program (e.g. a list of work orders, work requests, temporary modifications, condition/problem identification reports, operability evaluations and determinations, etc.);
- verify that there is a proper, well-coordinated and functioning system for conducting regular inspections, preventive maintenance, repairs, extensions, modifications and upgrades of the network;
- conduct analysis of the system to determine if requirements of safety and reliability of supply and customer services quality standards are met;
- identify any strength and evaluate the root causes of any weaknesses identified during the detailed analysis above. (Possible root causes might include lack of training, lack of accountability, unclear responsibility, procedure inadequacy, undue schedule pressure, or inaccuracy in design-basis).

5.2 Site Inspection

Site inspections are conducted to evaluate the actual condition of the selected item for inspection and to verify the adequacy and effectiveness of the various undertakings of the Licensee in delivering electricity services. The site inspection

of the selected item should be conducted in a systematic manner to minimize the possibility of any significant feature being overlooked. As part of site inspections the team may selectively perform the following tasks:

- verify that the network is implemented in accordance with the design;
- inspect the physical condition of assets to verify whether or not actual care is being taken in accordance with manuals and procedures;
- take measurements, as appropriate, of some parameters of the sample network and its components;
- verify that construction, operation, maintenance and inspection procedures are properly implemented;
- check the operational safety and environmental condition of the network and verify that the situation satisfies corresponding standards;
- verify that temporary and permanent corrective actions taken by the Licensee for operational problems are appropriate and adequate, and that causes are identified and recurrent problems are avoided;
- verify that the customer services are performed in compliance with the Proclamation, Regulations, directives and procedures;
- verify that there are adequate resources (e.g. suitable equipment is available for the maintenance work to be carried out properly) and properly qualified personnel at the Licensee's organization to handle all the various tasks.

5.3 Investigation Phases

Since the scope and completeness of each investigation depends upon the conditions, the guideline may provide two phases of investigations.

5.3.1 Phase I Investigation

Phase I Investigation would be an inspection to assess general condition of the item and determine the need for any additional regulatory investigations and analyses. It would consist of a visual examination of the item and review available operating statistics. It is not intended that costly explorations or analyses would be performed during a phase I inspection.

The primary purpose of the phase I investigation is to identify expeditiously those items which may pose hazards to human life or property.

The phase I investigation shall develop an assessment of the general condition with respect to safety of the item based up on available data and a visual inspection, determines any need for emergency measures and concludes if additional studies, investigation and analyses are necessary and warranted. A review shall be made of pertinent, existing and available data relative to the design, construction and operation of the facilities, including electrical and

mechanical operating equipment and detailed systematic visual inspection shall be performed of those features relating to the stability and operational adequacy of the item. Based up on findings of the review of the engineering data and visual inspection, an evaluation shall be made of the general conditions of the item.

5.3.2 Phase II Investigation

Phase II investigations would be performed (supplementary to phase I investigation) where the results of the phase I investigation indicate the need for additional investigations, in-depth studies or analyses. This would include, as required, all additional visual observations/examinations, measurements, and calculations involving statistical analysis.

6. INSPECTION PROCEDURES

6.1 Arriving at the site/office

The inspector shall arrive at the site/office on weekday working hours

6.2 Gaining Access

When entering the site, the inspector shall enter (drive) first to the same entry point used by the employee of the Licensee. At the gate the inspector shall state:

- his name;
- his employer's name;
- reason for the visit.

The employee at the gate may direct the inspector to speak to an official at the site/office.

6.3 Denial of access

If access to facilities is denied in anyway, the inspector shall politely determine if the individual denying access is the appropriate official to make such a decision. The inspector shall ask the reason for denial of access and verify that the purpose and authority to conduct inspection (proclamation, regulation and License Terms and Conditions) is understood. If access is still denied, the inspector should abide by the Licensee's wishes, document the name of the person denying the access, and then call his/her supervisor at the Agency.

7. MAJOR INSPECTION ITEMS

This section provides guidance for performing site inspection and shall serve as the basis for developing a detailed checklist for each network. Some of the items to be considered under inspection are listed below and the detailed checklists are annexed to this Guideline (page 13-28).

7.1. Design

The inspector shall check that engineering design of the network under inspection is in accordance with the principles and disciplines in the current state of accepted technology for design of this type of network that shall ensure safe, reliable and efficient supply system.

7.2 Interviews

The inspector shall ask site supervisors and other personnel of the Licensee about the overall performance including constraints in general and the Licensee's procedures for operations, maintenance, safety and customer handling in particular. In addition to this, the interview shall include training issues.

7.3 Supervision

The inspector shall check that the Licensee provides adequate supervision to ensure proper operation of the network in compliance with all applicable laws, regulations, license conditions and requirements.

7.4 Standing Operating Procedure

The inspector shall check that detailed operating procedures for most normal conditions associated with supply network/equipment are in place and understood by all the operation personnel.

7.5 Emergency Operating Procedures

The inspector shall check that Emergency Operation Procedures are prepared in a plain language, approved by the Licensee's officials, understood by all concerned operation staff and placed at easily accessible places.

Emergency Operating Procedures are normally developed to guide operations during abnormal catastrophic events that pose hazard to personnel and public. The consequences of not dealing with these events in a systematic manner could further complicate the event, cause damage to equipment, loss of supply, and possible personnel injury.

7.6 Reporting Abnormal Operations

Properly informed personnel can correct abnormal conditions in less time and with less chance of making mistakes than if they were not properly informed. Therefore, the inspector shall check that

- abnormal conditions are promptly reported either in writing or verbally, of essential information to all those who need to know;
- the load dispatcher or system controller is informed immediately of any abnormal condition that affects system operation, especially if correct action is needed;

- all essential information concerning abnormal conditions are entered in the logbook.

7.7 Training Program

The inspector shall check that the personnel assigned to operate the network and to handle customer service are adequately trained in subjects pertinent to the network operation, maintenance and customer service, with emphasis on safety, health, reliability, environmental controls, emergency procedures and customer handling. If records of training are vague and/or if no training programs are documented, this is an indication that training is a problem.

The inspector shall ensure that well coordinated training programs for personnel are established.

7.7.1 Initial Training

The inspector shall ensure that new personnel and apprentices receive training on issues mentioned in paragraph 7.7 before assuming operational duties.

7.7.2 Regular Refresher Trainings and Discussions

The inspector shall ensure that regular refresher trainings and discussions in safety, reliability and customer service as well as abnormal operating conditions are conducted by the managers, operation's heads or other qualified personnel from inside or outside the organization.

The discussions should be tailored to fit the needs of the personnel and should, therefore, include safety and reliability issues and abnormal conditions, which have occurred at the network's facilities in the past, along with a discussion of operating problems encountered.

7.8 Plant Security (Substations and Power stations only)

The inspector shall ensure that the plant has adequate perimeter barrier designed to discourage unauthorized entry by persons, animals or vehicles.

7.9 Communication Facilities

The inspector shall check that each network, where appropriate, has adequate communication facilities available to the Licensee's personnel.

7.10 Lighting

The inspector shall check that operations of indoor facilities/networks are being undertaken at illumination level recommended for such operations.

7.11 Safety

7.11.1General Safety of Personnel and Equipment

The inspector shall check that where abnormal operating conditions involve hazards to personnel and equipment, their safety receives top priority in any remedial action taken by the operator.

7.11.2 Fire Fighting Equipment

Licensee's personnel shall have properly maintained fire suppression equipment available in sufficient quantities and located as required at fire zones.

- The inspector shall verify that all fire control equipment such as hoses, sprinkler systems, fire extinguishers and alarms are fully operational.
- For the extinguishers, check the inspection frequency and the date of last recharge.

7.11.3Safety Signs and Labeling

The inspector shall check that there are signs at the appropriate points indicating the level of danger (High Voltage, Radiation hazard, etc).

The inspector shall also check that the facilities are designed, constructed and operated so that major equipment are easily identified.

7.11.4 Personnel Safety and Health Equipment

The inspector shall ensure that operating and maintenance personnel are required to wear and use approved safety equipment.

7.11.5Noise Control

The inspector shall check that noise is effectively controlled to prevent health hazards to persons at supply networks and to nearby residents.

7.12 Equipment

7.12.1General

Equipment shall be adequate in type, capacity and numbers to permit the operation to meet regulatory requirements and license conditions. Equipment shall be maintained so as to consistently perform the work for which it is intended

7.12.2 Standby Equipment

The inspector shall check that, so far as is reasonably practicable, there are adequate and reliable units of standby equipment and facilities.

7.12.3 Housekeeping

The inspector shall ensure that there is a high standard of housekeeping in the network/facility.

7.12.4 Maintenance

Effective preventive maintenance procedures and programs for equipment and network facilities shall be developed and utilized. In this regard the inspector shall check some of the following items.

1. **Adequacy of Procedures**: Examine the sample of procedures to verify overall procedure content consistent with regulatory requirements and License Terms and Conditions including

   - **Technical content of procedures:** Examine the technical content of the procedures selected and verify that they are adequate to control safety-related operations within applicable regulatory requirements, including switching, isolating, earthing, issuance of permit to work and sanctions for test.

     Determine whether the procedures shall accomplish the activity within the design characteristics and the safety review considerations. [During this evaluation, the review may include technical specification, limiting condition for operation, descriptions, vendor manuals, design information, piping and instrumentation drawings, instrumentation and electrical wiring and control diagrams]

     Verify that appropriate technical specification and vendor or design operating limitation such as insulation limits heat up/cool down rates, pressure/temperature limits, power handling capability limits, safety limits, and safety system settings have been incorporated into the procedures.

   - **Procedure Updating:** Verify that selected procedures and their related forms, attachment, and referenced documents in working files are current with respect to revision and temporary change.

2. **Usability of Procedures:** Review the sample of procedures to verify that procedures are usable by assessing the degree to which accepted human factors principles have been incorporated into each type of procedure.

7.13 Control Center Operations

The Inspector shall check that the control center operators

- have copies of the Emergency Operating Procedures for all plants they operate;
- understand each plant;
- use all available indications to assess the problem because many points may often initiate trouble alarms;
- consider the development of alarm response procedures that list all incoming alarm points for different trouble alarms and the required actions.

7.14 Customer Services

The inspector shall check whether or not the services provided by the Licensee to its customers meets the corresponding customer service standards.

7.15 Exit Interview/Meeting

At the beginning of the inspection, the inspector shall notify the Licensee that an exit interview/meeting would be conducted at the conclusion of the inspection. The exit interview/meeting is a summary of the inspection results, which allows the inspector to communicate inspection findings to the Licensee.

Early in the inspection, the inspector shall determine the best time to interview the appropriate personnel. This shall allow the inspector to ensure that a supervisor or manager is present to answer questions. If the Licensee is unable to attend, the inspector may contact the Licensee by telephone to conduct the exit meeting on a day and time convenient to all parties.

7.16 Documentation

The inspector shall make all notes, observations, and comments during the inspection, and not later in the office. The inspector should maintain control of all such evidence during an inspection and thoroughly review it before leaving the site.

8. REPORTING

8.1 The Report

The report is an inspection finding document after a study of the operational performance and evaluation of the behavior of the inspected network and activities. The report may contain, but not limited to:

- a summary of existing information and results of inspections;
- findings of the inspection concerning the Licensee's performance with respect to service delivery to its customers;
- evaluation of operational adequacy of the network, as per the regulation requirements and license terms and conditions, maintenance facilities and features and safety of the personnel;
- description of the overall situation of the network;
- an assessment of the general condition of the network with respect to safety based upon the findings of the visual inspection and review of engineering findings;
- possible remedial measures or revisions in operating and maintenance procedures that may correct deficiencies and hazardous conditions found during the investigations.

- summary of additional regulatory issues, engineering data to be obtained to determine the compliance conditions,
- technical assessment of safety including deficiencies and hazardous conditions found to exist,

Where results indicate significant departures from service standards, the regulations and license terms and conditions or non-compliance with the appropriate standards, the inspector shall give his opinion of its significance, any needs for additional studies, investigations or analysis considered essential to the safety, reliability and customer service under consideration which must be listed, together with an opinion about the urgency of such additional work.

8.2 Format and Content of the Report

Once the office and site inspections are finalized the inspector shall compile a report covering the final outcome and findings of the inspection within the timetable set for the task. In general the report may comprise:

- introduction;
- objective/purpose;
- scope;
- methodology;
- review of the findings;
- conclusions and recommendations.

The report shall be well structured and articulate the major findings of the inspection against the compliance requirements (regulations, license terms and conditions and service standards) with location oriented recommendations indicating potential areas for efficiency improvements.

The report may be prepared either in Amharic, English, or in both languages as may be required, using standard A4 size paper and font size of 12-14.

8.3 Submission

The inspector shall submit his report within maximum of four weeks after the conduct of inspection.

ANNEXES

DEFINITIONS

"Agency" means the Ethiopian Electricity Agency
"Equipment" means all assets of a power system.
"Inspector" means any person authorized by the Agency to undertake inspection pursuant to Article 19 of the Proclamation No. 86/1997
"Proclamation" means the Electricity Proclamation No. 86/1997

"Regulation" means the Electricity Regulation No.49/1999

"Root Cause(s)" means the basic reason(s) (i.e., hardware, process, and human performance), for a problem, which if corrected, shall prevent recurrence of that problem.

INSPECTION CHECKLIST

A. INSPECTION OF EXISTING ASSETS AND CUSTOMER SERVICES.

A.1 General

- A visual inspection to form a view as to the general condition of assets e.g. rusty steelwork, untidy and cluttered substations, leaning supports, overhead line conductors with varying sag etc
- Where appropriate, readings of some parameters should be taken from installed instrumentation to determine whether the assets are fit for their purpose i.e. are they being used within their current ratings? And in the case of low voltage supply to customers, is adequate voltage being supplied? (This may entail the Inspector taking voltage readings at the consumer's premises).
- From visual inspection does it appear that adequate protective devices are provided? e.g. overcurrent and earth fault relays for MV systems, fuses or mcbs covering LV systems, and more sophisticated protective relays for HV systems
- Check that a reasonable number of fusible cut-outs or automatic switching devices are fitted to restrict the number of consumers affected by any fault on the Licensee's assets
- Examine the maintenance records for the assets to determine whether it is of reasonable frequency, conforms to the Licensee's procedures and/or conforms to the manufacturer's recommendations

A.2 Power Stations Inspection Checklist

In general, practices undertaken by power station owners and operators that contribute significantly towards the continuous improvement in safety and reliability include:

- Condition monitoring
- Regular site inspections/asset and system audits
- Scheduled maintenance
- Benchmarking

- Identification of operational hazards associated with the power plant, e.g., rotating machinery, voltage, moving parts, high temperatures, explosive atmospheres
- Risk awareness
- Risk analysis
- Implementation of risk management
- On-going operator training

The following checklists contain significant elements of inspection.

ITEM	Yes	No
Are there appropriate safeguards around moving parts?		
Are there sufficient safeguards (rails etc.) where there is a potential to drop either from a significant height or onto moving or electrical parts?		
Are areas where there may be gaseous fumes (oil store, battery room) adequately vented? Are there clear signs pointing out the danger of explosion or asphyxiation?		
Are there sufficient safeguards at the reservoir and sluiceways?		
Is there a need for protective fencing?		
Are appropriate danger notices fitted?		
Are appropriate clearances maintained?		
Are the fire and electric shock notices and equipment appropriate?		
Is metalwork appropriately earthed?		

Additional Power Stations and Substations Common Inspection Checklist

1. Visual Information/display

ITEM	Adequate	Not Adequate
Availability		
Visibility		
Content		
Sufficiency of information		
Clarity		

Accessibility		
Stability		

2. Control function/control device

ITEM	Ok	Bad
Availability		
Accessibility		
Identification (labels and tag outs)		

3. Alarm/annunciation

ITEM	Yes	No
Missing		
Too many		
Visibility		
Continuously illuminated		
Continuously repeated		
Disabled		
Computer printout and control room log compatibility		

4. Environment

ITEM	Yes	No
Too hot		
Too cold		
Too humid		
Too dark		
Too bright		
Too noisy		
Inaccessible workplace		

Dangerous work place		
Vibration impedes work		

5. Communication

ITEM	Yes	No
Missing/lack of information		
Misunderstood/misinterpreted		
Inconsistent information		
Logbook maintenance		
Document management		
Standard terminology		
Information about system/equipment		
Information not sought		
Information not used		

6. Coordination of work/supervision

ITEM	Adequate	Not Adequate
Supervisory availability		
Task description/explanation		
Coordination of team activities		
Assignments of roles and responsibilities		
Task progress monitoring		
Chain of command		
Staff working hours program		
Pre-job briefing		
Shift turnover		
Planning and scheduling work		

Resource allocation		

7. Work Practices

ITEM	Practiced	Not Practiced
Formalization of work practices		
Self-checking		
Independent verification		
Walk downs		
Inattention to detail		
Questioning attitude		
Awareness of equipment status and plant condition (situation awareness)		
Safe work practices		
Tools/materials used		
Teamwork		
Housekeeping		
Too many task interruptions		
Too many concurrent tasks		
Excessive workload		
Time pressure to complete tasks		

8. Fitness for duty

ITEM	Practiced	Not Practiced
Substance abuse (chemical and alcohol)		
Illness		
Fatigue		
Excessive overtime		
Working too long without breaks		

Too many distractions		
Night work		
Called into work outside regular schedule		

9. Facilities and Operations Probability

ITEM	High	Low
Loss of station service		
Loss of Plant DC Control and Protection		
Loss of Plant Control Alternating Current (AC)/ Uninterruptible Power Supply (UPS)/Inverter		
Loss of Air System		
Abnormal Operation of the voltage regulators and governors		

A.3 Transmission Lines Inspection Checklist

Region:- _____ Line Stretch: from _____ to _____

Voltage level:- _____ KV Type of tower _____

Inspected Section: Between _____ and _____

Inspector(s): _____ Date: _____

Item	Condition			Comment
	OK	Marginal	Bad	
Condition of supports appear adequate				
Steel towers are not excessively rusty without missing steelwork				
Wooden poles are not rotten				
Concrete poles are not badly chipped and are not with exposed rusting reinforcing bars				
Metalwork of supports and cross arms are appropriately earthed				

Insulators are not badly chipped or some of the strings are not missing				
Insulators in stay wires are positioned appropriately				
Stay wires, over the entire length, for signs of corrosion and broken or unraveled strands.				
Danger notices are adequately posted				
Vibration dampers are correctly positioned				
Anticlimbing structures are properly mounted				
Clearances from ground, vegetation and other structures seem adequate				
Additional observations and comments:				

A.4 Substation Facilities Inspection Checklist

Region: _____ District _____

Location/substation name: _____

Inspector(s): _____ Date: _____

Outdoor Substation (General Conditions)

Item	Condition			Comment
	OK	Marginal	Bad	
Properly fenced				
Restricted Access				
"Danger High Voltage" signs				
Earthing System				
Bus-bars and cables				

Towers and Insulators				
Corrosion-free structures				
Rock and gravel (no vegetation, …)				
Lightning Protection				
Capacitor/Reactor banks				
Air disconnect switches				
Oil circuit breakers				
Vacuum circuit breakers				
SF_6 Circuit Breakers				
Auto Reclosers				
Control Transformers				
CTs and PTs				
Lighting system				
Additional observations and comments:				

Electrical Room/Control Room

Location/substation name: _____

Item	Condition			Comment
	OK	Marginal	Bad	
Restricted Access				
Availability of Station Single Line Diagram				
Availability of safety signs/notices				

Voltage level markings (labeling)				
Availability of proper Logbook				
Essential data record of logbooks				
Proper material storage				
Corrosion-free structures				
Properly ventilated room				
Proper clearances				
General housekeeping				
Fire extinguishers, sand, first aid kit				
Proper illumination				
Emergency lighting system				
Communication facilities				
Physical condition of the building				
Availability of maintenance program				
Additional observations and comments:				

Substation Power Transformer

Location/substation name: _____

Size:_____ MVA Rated Voltage level: _____ KV

Item	**Condition**			**Comment**
	OK	**Marginal**	**Bad**	

Condition of insulators and bushings				
Alignment of insulators and bushing				
Alignment of arc horn gaps				
Condition of Conductors/Cables				
Gauges operable				
Proper clearances				
No signs of leakage				
Equipment Earthing				
Proper cooling system				
PCB stickers				
Breather (colour of silica gel crystals)				
Structural condition				
Additional observations and comments:				

Switchgear/Panel Board

Location/substation name: _____

Item	**Condition**			**Comment**
	OK	**Marginal**	**Bad**	
Door and cover properly secured				
Proper ventilation				

Proper working space and clearances				
Panel identification markings				
Circuit identification markings				
Voltage level markings				
Protective device indicators				
Equipment Earthing				
Panel meters operative				
Additional observations and comments:				

Battery Room

Location/substation name: _____

Item	Condition			Comment
	OK	**Marginal**	**Bad**	
Restricted access				
Proper ventilation				
Eyewash station				
Neutralizing solution				
Proper working space & clearances				
Electrolyte level				
Signs of out-gassing				

Voltage level markings				
Equipment Earthing				
Condition of battery charger				
Additional observations and comments:				

A.5 Distribution Networks Inspection Checklist

Civil infrastructure

Check for Buildings that house equipment (ex. transformer cabins) may need attention (cracking, fire and other hazards, etc)

Distribution Networks

Region:- _____ District _____

Inspector(s): _____

Date: _____

Poles and Supports

Section:- Between _____ and _____

Item	Condition			Comment
	Yes	Marginal	No	
Bent, cracked, broken or leaning poles				
Loose or twisted cross arms				
Loose or defective brackets				
Loose or defective hooks or pins				
Missing hardware				
Insulators unattached from hooks or pins				
Conductors unattached from insulators				
Insulators flashed over or obviously contaminated				
Tie wires unraveled				

Termite/insect damage or decaying poles				
Loose or unattached guy wires or stubs/supports				
Guy strain insulators broken				
Indications of burning				
Additional observations and comments:				

Distribution Transformers

Transformer No. _____ Location:-_____ Size:_____kVA

Item	Condition			Comment
	Ok	Marginal	Bad	
Good Paint condition and corrosion free				
Placement on mount/enclosure				
Accessibility compromised (shrubs, trees, and vine growth, bird nests, etc)				
Oil leakage				
Flashed, cracked, contaminated, discolored insulators and bushings				
Proper earth lead attachments				
Earth wire on arrestors unattached				
Security and structural condition of mount/enclosure				
Breather Silicajel colour changes (blue to pink)				

Bent or broken bushings and cutouts				
Misaligned bushing and arc horn gaps				
defective lightning arrestors				
Open/damaged fuse boxes				
Unacceptable value of earth resistance at the grounding point				
Additional observations and comments:				

Miscellaneous

Section:- Between _____ and _____

Item	**Condition**			**Comment**
	Yes	**Marginal**	**No**	
1. Conductors and cables				
Adequate conductor clearance				
Broken or worn strands				
Excessive sag				
Inadequate sag				
Loose connection				
Insulation wearing on secondary wire (e.g. service drops)				

2. Vegetation and right-of-way				
Leaning or other dangerous trees				
Vegetation growth into the line				
Unapproved/unsafe occupation or secondary use				
Additional observations and comments:				

Underground systems

Underground cable systems may be checked for exposed cables, cable termination poles, cable guards, terminators and arrestors.

A.6 Customer Premises

In the case of Customer's premises

- Is the customer's installation protected by a fuseable cutout or automatic switching device suitably locked or sealed?
- I s there a suitable customer's earthing arrangement?
- Is the customer's energy meter regularly calibrated?

A.7 Customer Services Quality Standards

In the case of customer service check for compliance with quality of service standards stated in the "ELECTRICITY SERVICES QUALITY STANDARDS DIRECTIVE – No. 2/2006".

Item	**Target**	**Comply?**	
		Yes	**No**
Restoring a supply following a distribution system failure	2 hours		
Providing an estimate of charges	3 days		
Giving notice of supply interruption	24 hours		
Voltage problems:			

Item	Target	Comply?	
		Yes	No
• Investigate & reply	15 days		
• Solution			
○ Simple work	3 months		
○ Complex work	1 year		
Responding to queries about meter accuracy	15 days		
Responding to queries from customers	5 days		
Providing a new supply, improving or relocating existing supply installation			
• single phase	4 days		
• three phase	13 days		
Reconnecting meters following payment	24 hours		
Meter reading	every month		
Responding to customer complaints	10 days		

B. INSPECTION OF A NEW PIECE OF WORK UNDER CONSTRUCTION

- The majority of the points to check for existing assets (above) also apply in the case of a new construction project.
- Where the work involves connecting new assets to the existing system the Inspector should check the adequacy of the safety procedures relating to switching, isolating and earthing of the existing assets together with the issue of permits to work and sanctions for test. These checks can be made against the Licensee's laid down procedures but it is important for the Inspector to be satisfied that these laid down procedures are adequate.
- In the case of underground cable installations checks should be made that the system to be used conforms to the requirements of appropriate regulations. In addition, the requirements for depth of laying and precautions to be taken in

respect of protective tiles or warning tape should be checked. Finally the Inspector should be satisfied that adequate records are being taken of where the cables are laid

C. SAFETY MANAGEMENT AUDIT CHECKLIST

Inspectors visiting a Licensee shall examine how the Licensee manages health and safety. The following provides a checklist for the Inspector.

Item	Yes	No
Policy		
Does the company have a clear policy for health and safety? Is it documented? Is it up-to-date?		
Does the policy specify who is responsible, for health & safety at the central level in the company?		
Do the Licensee's staffs know about the policy and understand it?		
Staff		
Have specific individuals been allocated responsibility for health and safety in each division or department?		
Does staff have sufficient information about the risks they run and the preventative measures that should be taken?		
Does the Licensee have the right levels of expertise? Are people properly trained in health & safety issues?		
Planning		
Does the Licensee have a health and safety plan?		
Is health and safety always considered before any new work is started?		
Has the Licensee identified hazards and assessed risks to their own staff and to the public and set standards for premises, substances, procedures and people?		
Are the standards measurable, achievable, and realistic? Are the standards implemented?		

Item	Yes	No
Does the Licensee have plans to deal with serious or imminent dangers, e.g., fires, floods, dam failure, etc?		
Performance		
Does the Licensee maintain a system of monitoring and assessment of its safety performance against its own standards?		
Does the Licensee maintain accurate records of injuries, death and ill health?		
Does the Licensee operate an internal health and safety audit?		
Did the Licensee take appropriate action on the most recent audit findings?		
When did the Licensee last review its Health & Safety policy and its performance?		