

## Health and Safety Instructions and Recommendations

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## Contents

<b>I</b>	<b>Preamble</b> .....	<b>1</b>
<b>II</b>	<b>Introduction</b> .....	<b>1</b>
<b>III</b>	<b>Scope</b> .....	<b>1</b>
<b>IV</b>	<b>Definitions</b> .....	<b>2</b>
<b>V</b>	<b>Safety Management</b> .....	<b>3</b>
<b>VI</b>	<b>Documentation</b> .....	<b>3</b>
<b>VII</b>	<b>Electrical Safety Rules</b> .....	<b>4</b>
	VII.1 General Rules.....	4
	VII.2 Communication and Control Rules .....	4
	VII.3 Rules for Working on Dead Electrical Equipment.....	5
	VII.4 Rules for Working on Live Electrical Equipment or Very Near Live Electrical Equipment .....	7
	VII.5 Switching.....	8
	VII.6 Work on Live Conductors or Very Near Live Conductors.....	8
	VII.7 Testing and Commissioning .....	8
<b>IX</b>	<b>Appendices</b> .....	<b>9</b>
	IX.1 Appendix 1: Minimum Working Clearance.....	9
	IX.2 Appendix 2: Minimum Design Clearances where Power Lines Cross or are in Close Proximity .....	10
	IX.3 Appendix 3: Minimum Separation across Point of Disconnection in Air.....	12
	IX.4 Appendix 4: Principles of Risk Assessment.....	12
	IX.5 Appendix 5: Example of Sample Risk Assessment Sheet .....	13
	IX.6 Appendix 6: Electrical Job Hazard Analysis Sheet .....	14
	IX.7 Appendix 7: Sample Safety Check Sheet .....	14
	IX.8 Appendix 8: Sample Safety Permit to Work.....	17
	IX.9 Appendix 9: Sample Energized Electrical Work Permit.....	17

## I Preamble

The information under this section is provided as advice in order to inform the reader of the important health and safety issues that need to be addressed before commencing works on high voltage or near high voltage systems. The recommendations represent a minimum set of requirements when working on or near electrical equipment rated at voltages above 1000 V. If higher standards are required by national regulations and/or local companies, then those higher standards should be adhered to.

## II Introduction

Electrical power systems contain large amounts of energy. Electrical arcs, as well as causing radiation burns, can vaporize materials causing fire and explosion. Voltages above 50 V can cause fatal interruption to heart rhythms and cause internal tissue damage.

In order to maintain safety, it is necessary to work to a framework of rules to suit the wide range of site situations. The effect of human factors, as well the physical environment in which work takes place should be considered in the application of these rules.

## III Scope

These recommendations are applicable to all service providers involved in the supply of site related services on power and distribution transformers, as well as work on near high and medium voltage systems and equipment.

This policy defines the minimum safety rules to be followed when working on or near electrical equipment rated above 1000 V.

It is strongly recommended that all service providers shall follow the safety rules below, or equivalent, for all site operations.

Each service provider may define additional rules and requirements based on local legislation, capabilities, skills, and the nature of services offered.

## IV Definitions

Medium or high voltage:	Above 1000 V <sub>AC</sub> .
Electrical equipment:	All medium and high voltage products, including power and distribution transformers.
Power system:	A connected network of electrical devices which, in the event of a short circuit, contains sufficient energy to cause serious burns to people or physical damage to the plant, other equipment or property.
Service provider:	Any organization working on or near electrical equipment.
Nominated person:	Qualified person nominated to have the responsibility for safety and control of a work party.
Qualified person:	Has the skills and knowledge related to the construction and operation of electrical equipment and installations. Understands the hazards of electricity and how to protect himself/herself from these hazards. He/she is undergoing on-the-job training and, in the course of such training, has demonstrated an ability to perform duties safely at his or her level of training and is under the direct supervision of a qualified person. He/she is considered to be a qualified person for the performance of those duties.
Trained qualified person:	Qualified persons shall, at a minimum, be trained in and familiar with the following: the skills and techniques necessary to distinguish exposed live parts from other parts of electrical equipment, the skills and techniques necessary to determine the nominal voltage of exposed live parts, the clearance distances for qualified and unqualified persons and the corresponding voltages to which the qualified person will be exposed, and the decision-making process necessary to determine the degree and extent of the hazard and the personal protective equipment and job planning necessary to perform the task safely.
Work party:	Persons working or testing under the control of a nominated person.
Work package:	Defined list of service related tasks to be completed by the work party within a set amount of time.
Switching:	Operation of equipment designed to alter the electrical state of an electrical installation, such as connection, disconnection, altering the flow of current or system operating voltage, inserting a switching device from a test to a service position, and withdrawing a switching device from a service to a test position.
Competence:	A combination of skills, knowledge, and practical experience, to enable a person to carry out tasks effectively and safely.
Customer:	Company in charge of the equipment and its operation.

## V Safety Management

These rules focus on electrical safety aspects and are to be implemented in association with other general safety guidelines (such as personnel transportation, manipulation of oil, use of personal protection equipment, work at height, etc.)

Each service provider shall have a documented electrical safety management policy (safety-related work practices program). The policy or program shall contain information on:

1. The application of electrical safety rules,
2. Training and competency,
3. Written authorization of people,
4. Review and audit of compliance.

Each service provider shall have suitable written procedures to ensure that electrical safety rules are applied to all site operations.

## VI Documentation

The following documentation is recommended to be produced by the nominated person prior to commencing work:

5. Risk assessment or electrical job hazard analysis sheet (see sample in section IX.5),
6. Safety check sheet (see sample in section IX.6),
7. Safety permits to work (see sample in section IX.8),
8. Pre-job briefing or tail-gate meeting form,
9. Energized electrical work permit if applicable (see sample in section IX.9).

These documents must be retained in job files for verification and audit.

## VII Electrical Safety Rules

### VII.1 General Rules

- a) All electrical equipment shall be treated as live unless made safe and released for work as described in section VII.3 below.
- b) Electrical equipment is subject to electrical safety rules when it is capable of being energized from a power system through operation of switchgear, or by the replacement of fuses or links.
- c) Electrical safety rules must, at all times, be applied in such a manner as to prevent danger to persons switching, working on, or in the vicinity of live apparatus.
- d) Each person within the work party must have the Competence to undertake the scope of work planned for them.
- e) Normally the customer personnel shall undertake all actions to safely disconnect and earth (ground) electrical equipment to be worked on.
- f) Normally service provider personnel shall not work on live equipment.
- g) Work packages which require work on live equipment or very near live equipment must follow relevant additional rules in section VII.4.
- h) Personnel on site must at all times wear appropriate personal protection equipment (PPE).
- i) Other PPE may be used according to local regulations and risk assessment controls.
- j) There must be safe and proper means of escape in the event of failure of any live apparatus.
- k) The nominated person must establish, prior to starting work, relevant telephone numbers for emergency services.
- l) Appropriate safety precautions shall be taken when working on high equipment to avoid injury through falling.
- m) No un-authorized person may enter the work area.

### VII.2 Communication and Control Rules

- a) For each work package a nominated person must be appointed in writing. The nominated person must understand the limitations of his work and the safe working area.
- b) The nominated person must have sufficient training and experience to be competent in the discharge of those responsibilities.
- c) Irrespective of whether the customer has completed all or part of the steps to safely earth (ground) electrical equipment, the nominated person shall ensure and verify that all electrical safety rules have been complied to.
- d) The nominated person has the authority not to proceed with work should he/she consider that compliance to electrical safety rules has not been met.
- e) Only the nominated person has the authority to issue a permit to work.
- f) All site work packages must have a written scope of work which clearly defines the tasks to be completed, the relevant time frame to complete tasks, the resources to be utilized as well as relevant contact details of the customer's representative.

- g) There must be arrangements to ensure communications are clear and not subject to misinterpretation. Typically the following may apply:
- Instructions are written down and repeated to the sender,
  - Instructions and confirmation times are noted,
  - The use of standard phrases which cannot be misinterpreted,
  - The use of standard schematics by all persons concerned.
- h) Work or switching must not be commenced by pre-arranged signals or time.
- i) Where there are numerous persons carrying out switching operations or work parties on the same circuit, a control person must be nominated and be responsible for safety co-ordination.

### VII.3 Rules for Working on Dead Electrical Equipment

A safe working area must be created and maintained in accordance with the following principles. All seven principles must be applied on every occasion:

- Step 1 Clearly identify work location,
- Step 2 Disconnect completely, secure against re-connection (lockout/tagout),
- Step 3 Provide protection against live parts,
- Step 4 Take special precautions when close to bare conductors,
- Step 5 Verify the installation is dead by approved means,
- Step 6 Carry out earthing (grounding) and short circuiting,
- Step 7 Issue a permit to work.

#### **Step 1: Clearly identify the work location**

- a) Sufficient labels, schematics, and plans must be available to clearly identify the location and the electrical equipment to be worked on.
- b) Where electrical equipment is not easily identifiable, such as cables, suitable identification arrangements must be made by the nominated person.
- c) Nearby live electrical equipment must be identified as dangerous by the application of highly visible temporary warning labels.
- d) There must be clear and continuous identification of the safe working area. It must be possible to easily distinguish between safe and dangerous areas throughout the course of planned work.

#### **Step 2: Disconnect completely, secure against re-connection**

- a) Verify that the electrical equipment has been safely disconnected and earthed (grounded).
- b) A suitable electrical gap (see section IX.2 and IX.3) must be provided across all points at which the apparatus may be made live including potential in-feeds from low voltage apparatus.
- c) The gap must be physically secured from inadvertent or willful re-connection, by the application of barriers or locks; or removal of fuses to a safe place; or removal of apparatus from its normal service position; or disconnecting/blocking stored mechanical energy devices.
- d) It shall not be possible for remote protection or control to reconnect the circuit under work through electrically closing of a switching device.
- e) A prominent warning notice must be fixed to each point of disconnection.
- f) All keys must be kept in a secure place.

**Step 3: Provide protection against live parts**

- a) All live apparatus in the vicinity of the work place must be locked off, clearly identified, and made inaccessible by barriers or other means.
- b) A risk assessment must be carried out to ensure that dangerous voltages cannot be directly or indirectly created on any of the electrical circuits connected to the point of work from nearby live circuits (see section IX.2) including the re-arrangement of earth (ground) connections.
- c) Special attention must be paid when the scope of work requires phased outages of different circuits. The sequence of circuits to be made dead must be clearly understood by all members of the work party. With each change of circuit from live to dead, or vice versa:
  - Access control and warning labels must be changed to suit,
  - Each member of the work party must fully understand which new circuits are now live.
- d) Work on electrical equipment connected to overhead lines must cease in the event of a lightning storm.
- e) On wood pole lines with one or more circuits live, precautions must be taken against steelwork being or becoming live.
- f) On certain high voltage cable systems it may be necessary to take precautions against large induced voltages, for example by fully insulated working.
- g) Precautions must be taken to prevent danger from low voltage conductors at the point of work.

**Step 4: Take special precautions when working close to bare conductors**

- a) Special precautions must be agreed with the nominated person when the minimum clearances (see section IX.1) cannot be made to unearthed (unground) conductors during preparation of the safe working area by applying screens, testing and applying portable earths (ground). Details on approach boundaries distances are given in appendix 1, section IX.1).
- b) The minimum safety precautions in the above circumstances are:
  - Wear appropriate voltage-rated gloves and applicable PPE,
  - Ensure access is suitable to avoid inadvertent slips,
  - Be accompanied by a second person who can render assistance.

**Step 5: Verify the installation is dead**

- a) If not restricted by the design of the electrical equipment, it must be confirmed dead by a suitable testing device at all points of work and all points where portable earths (grounds) are to be applied.
- b) The testing device shall be of a proper category rating and proved before and after each test.
- c) Where the design of the electrical equipment precludes this, other suitable arrangements shall be agreed with the nominated person. Typically: firing a spike through underground cables, using proximity testing devices on insulated conductors, operation of switches to earth (ground), or tracing cables or conductors back to a visible earth (ground) point.

**Step 6: Verify earthing (grounding) and short circuiting**

- a) The electrical equipment to be worked on must be connected to earth (ground) by connections and conductors capable of carrying the full short circuit current at that point.
- b) Where possible the electrical equipment shall be earthed (grounded) by a fully rated switch.
- c) Earths (grounds) must be applied between the point of work and all possible sources of HV supply, and they shall remain in position for the full duration of work.
- d) Earths (grounds) must be applied by a qualified person who is wearing all applicable PPE and FR clothing to match the 'Hazard I Risk' category outlined in NF PA 70E.



- e) Portable earths (grounds) shall be applied to all phases and in such a manner as to prevent danger from residual charge or induced voltages.
- f) Separate earths (grounds) at the point of work shall be connected to create an equi-potential zone for all persons at the point of work. They may be moved during the course of the work.
- g) Precautions shall be taken to prevent danger from voltages developed across earth (ground) conductors connected to earth (ground) at different points.

#### **Step 7: Issue a permit to work**

- a) Note: The permit to work is about control of the workplace and people. It is a summary of the previous protective measures and hazards. It is also a clear statement of responsibility from the nominated person for these protective measures.
- b) The electrical equipment to be worked on must be released for work through the issue of an electrical permit to work at the point of work. The nominated person issuing this is responsible for creating and maintaining the safe working area in accordance with the seven steps principles.
- c) The permit to work shall contain clear, legible details of:
  - The location of the work, and the precautions that have been taken to establish the safe working area,
  - The scope of the work
  - Hazards in the immediate area,
  - Completion of site risk assessment,
  - Completion of safety check sheet,
  - Signature of the nominated person in charge of the work party, times and dates of issue and cancellation,
  - Signatures of the work party members.
- d) The nominated person in charge of the work party shall be responsible for the safety of his work area and all other persons in his work party regardless of seniority.
- e) Warning signs and demarcation equipment (barricades) must not to be removed until after cancellation or the issue of further safety documents.
- f) The nominated person in charge of the work party shall be responsible for ensuring all persons and tools are withdrawn on completion of work, and hand over of the electrical equipment in proper condition according to the work undertaken.
- g) If the boundary of the safe working area changes during the course of the work, further permits to work must be issued.

### **VII.4 Rules for Working on Live Electrical Equipment or Very Near Live Electrical Equipment**

All work packages that require work on live electrical equipment or very near live electrical equipment, other than energized troubleshooting, must have prior written approval from the local service provider manager, who must be satisfied that personnel have the appropriate skills to undertake the required task.

The rules in sections VII.1 to VII.3 shall be followed where relevant.

The risk assessment shall specifically evaluate whether the work can be done dead or in some other way, and what additional special safety measures must be undertaken.

## VII.5 Switching

Note that switching includes insertion or withdrawal of a switching device.

Switching must be undertaken by the appropriate and authorized customer personnel in control of the system with the approval of the service provider personnel.

Appropriate personal protection equipment must be worn by personnel in the switching area during switching operation. Overalls, gloves, and a safety visor that are at least flame retardant must be worn.

Where possible, switching shall be undertaken remotely.

## VII.6 Work on Live Conductors or Very Near Live Conductors

Any work which cannot be done within the safe working clearances defined in section IX.1 must be the subject of a special written procedure (Energized Electrical Work Permit, see section IX.9), and carried out by specially trained and authorized (Qualified) persons.

Work is considered 'Live work', if it is carried out within the live zone distances defined in section IX.1 (Prohibited approach boundary) or if the work requires the removal of covers, doors, or barriers to expose live conductors.

Work must only be carried out by a (qualified) person who is properly trained and authorized in writing, and who is familiar with the function and operation of the electrical equipment concerned.

Specific PPE according to the hazard/risk category outlined in NFPA 70E must be worn by personnel undertaking the work. Overalls, gloves, and a safety visor that are at least flame retardant must be worn.

## VII.7 Testing and Commissioning

Where it is necessary to carry out electrical tests on electrical equipment, the safe working area must be established by steps 1 to 6 as described in section VII.3, before being released for tests by a safety document, and earths (grounds) removed.

The test area must be under the control of a suitably competent (qualified) person and precautions taken to avoid electric shock as in step 4 in section VII.3.

Additional warning signs and barriers must be used to protect other persons nearby from test voltages. If signs and barriers do not provide sufficient warning and protection from electrical hazards, an attendant shall be stationed to warn and protect employees.

Work on electrical equipment shall only be done, or supervised, by a person competent (qualified) to recognize danger and apply controls from:

- Live low voltage wires AC and DC,
- Voltages arising from current transformers, protection, pilot cables, and earths (grounds),
- Primary power conductors at high or low voltage,
- Interference with fully operational power systems,
- Test equipment.

## IX Appendices

Notes on use of appendices:

The following tables are for guidance only. They should be used as part of a thorough risk assessment. Where possible, consult local standards, which may state different figures and methods of application to be adhered to.

### IX.1 Appendix 1: Minimum Working Clearance

The minimum working clearance is the minimum distance, in air, between a live exposed conductor, and any part of a person's body, tool, conductor or apparatus that a person may be touching. The clearance must take into account the nature of the work and relative positions of the live conductor and the working area.

Where work infringes this clearance, additional control measures should be implemented to maintain safety.

Where work infringes the live working zone, it shall be considered to be live work.

<b>System Voltage kV</b>	<b>Minimum Working Clearance mm</b>	<b>Live Working Zone mm</b>
<1	700	200
10	1350	350
20	1400	400
36	1580	580
70	1900	900
132	3100	1100
275	3800	1800
480	5200	3200

Source: 52320000EN 50110-1, whereas in this standard:

- Minimum working clearance is 'Dv' (Outer limit of vicinity zone),
- Live working zone is 'Dc' (Minimum working distance) in this standard.

Approach boundaries to exposed energized parts for shock protection (mainly applicable in the USA).

#### (1) Definitions

- Limited approach boundary: A shock protection boundary to be crossed by only qualified persons (at a distance from a live part), which is not to be crossed by unqualified persons. Set your barricades here or at flash protection boundary if it's larger than 3050 mm (10 ft.).
- Restricted approach boundary: A shock protection boundary to be crossed by only qualified persons (at a distance from a live part) which, due to its proximity to a shock hazard, requires the use of shock protection techniques and equipment when crossed (use voltage rated PPE and equipment).
- Prohibited approach boundary: A shock protection boundary to be crossed by only qualified persons (at a distance from a live part) which, when crossed by a body part or object, requires the same protection as if direct contact is made with a live part.

- (2) This distance is for shock protection. If flash protection boundary is greater, the barricades need to be at flash protection boundary.

- (3) Protection boundary may also need to be extended if conductive materials that may come in contact with energized parts are being handled.

All dimensions are live part to employee:

<b>Nominal System Voltage Range</b> <i>Phase to Phase</i>	<b>Limited Approach Boundary</b> <i>Location of barricades to protect unqualified persons from electrical shock</i>	<b>Restricted Approach Boundary</b> <i>Qualified person wears voltage rated PPE before entering this area</i>	<b>Prohibited Approach Boundary</b> <i>Entering this area may result in serious injury or death</i>
kV	mm	mm	mm
0.051 to 0.750	3050	305	25
0.751 to 15	3050	660	180
15.1 to 36	3050	790	255
36.1 to 46	3050	840	430
46.1 to 72.5	3050	990	635
72.6 to 121	3250	1050	815
138 to 145	3350	1100	940
161 to 169	3550	1220	1070
230 to 242	3950	1600	1450
345 to 362	4700	2600	2450
500 to 550	5800	3450	3300
765 to 800	7300	4550	4400

## IX.2 Appendix 2: Minimum Design Clearances where Power Lines Cross or are in Close Proximity

These provide a useful guide when assessing the degree of risk from nearby exposed power lines. They do not take into account the additional risks of failure created by extreme weather conditions or poor condition of the equipment.

The clearances are calculated for the upper conductor operating at its maximum likely temperature and the lower conductor at 25 °C less. They must also allow for a maximum wind loading swing of 45 degrees.

<b>System Voltage</b> <b>kV</b>	<b>Minimum Design Clearance</b> <b>between circuits</b> <b>mm</b>
<1	1000
10	1800
24*	1900
36	2000
70	2300
132	2700
275	3700
480	4400

\* Extrapolated

Source: derived from UK spec. EATS 43-8

Company vehicles or mobile equipment capable of having parts of its structure elevated near energized overhead lines shall be operated so that a clearance of 3050 mm (10 ft.) is maintained. If the voltage is higher than 50 kV, the clearance shall be increased 100 mm (4 in.) for every 10 kV over that voltage. However, under any of the following conditions, the clearance may be reduced:

- If the vehicle is in transit with its structure lowered, the clearance may be reduced to 1220 mm (4 ft.). If the voltage is higher than 50 kV, the clearance shall be increased 100 mm (4 in.) for every 10 kV over that voltage,
- If insulating barriers are installed to prevent contact with the lines, and if the barriers are rated for the voltage of the line being guarded and are not a part of or an attachment to the vehicle or its raised structure, the clearance may be reduced to a distance within the designed working dimensions of the insulating barrier.

### IX.3 Appendix 3: Minimum Separation across Point of Disconnection in Air

These distances are between open isolator blades, or distances between fixed points of disconnection. Where separation is not fixed, such as overhead line spans, greater clearances will be required (see IX.1 and IX.2). Consideration should also be given to other conditions which may bridge or degrade the insulation gap.

<b>System Voltage</b> <b>kV</b>	<b>Electrical Clearance</b> <b>(Phase to earth/ground)</b> <b>mm</b>
10	229
24*	330
36	432
66	786
132	1473
275*	2800
480*	4000

\* Extrapolated

Source: derived from EN 60129

### IX.4 Appendix 4: Principles of Risk Assessment

The following outlines the very basic principles of risk assessment. There is a considerable amount of information generally available on the topic.

Risk assessment should be carried out at both the planning and implementation stages of projects. It is the key to the application of rules and to setting up the 'Safe Working Area'.

There are three principles:

- 1) Identify the hazards  
These are things which have the capacity to cause harm in any given situation.
- 2) Assess the degree of risk  
This is much more difficult. It takes into account the hazard in relation to the tasks, the potential severity of failure, and the likelihood of failure. It must consider the competency of the people, human factors, technical factors, and environmental factors. The degree of risk will change if unforeseen circumstances alter the work. In these circumstances the risk should be re-appraised.
- 3) Define and implement controls  
This will be determined by the degree of risk. There is a hierarchy of the preferred type of controls, starting with removing the hazard and descending to the use of PPE. Controls may be a combination of physical measures and management of people and documentation/rules. They must take into account human factors.

IX.5 Appendix 5: Example of Sample Risk Assessment Sheet

Risk Assessment Record									
Customer name:		Substation name:			Assessed by:				
Site name:		Job number:			Date:				
1	2	3	4	5	6	7	8	9	
No.	Identification of Hazard	Severity Rating (1-5)	Like-likelihood (1-5)	Risk Factor	Control Measures Proposed	Revised Likelihood	Revised Risk Factor	Comments	
1	Electric shock during commissioning and testing of new installations	5	4	20	1. Ensure that energizing of the system cannot take place without a permit to work being issued by the supervisor. 2. Only competent (qualified) persons appointed by the supervisor shall carry out the work. 3. All work shall be detailed in the relevant method statement and briefed to the relevant personnel at the start of the shift. 4. All testing shall be carried out using suitable insulated tools and PPE (gloves). 5. Energizing of the system shall be controlled from a central point and confirmed by telephone before permit is issued. 6. All work must be carried so that the testing device is secured through use of harness. 7. Suitable signage to be displayed. 8. All electrical testing devices shall be competent and shall provide evidence of their competence at the relevant voltage. 9. Adequate provision shall be made for first aid in the event of an electrical shock.	1	5	Electric shock during commissioning and testing of new installations	

IX.6 Appendix 6: Electrical Job Hazard Analysis Sheet

Yes	No	N/A	Considerations for Task/Job: _____
			Is the job scope understood? The job scope must be understood before continuing the analysis and performing any work.
			Am I trained and qualified to do the task? Only trained and qualified employees may perform electrical task or complete this analysis. To be qualified, you must understand the construction and operation of the particular equipment that you have been asked to work on and how to avoid the hazards associated with this equipment and environment.
			Have I performed this task before? Contact your supervisor if you feel you are not qualified to perform the task or complete this analysis.
			Have you conducted a pre-job briefing? Before starting each job, the employee in charge shall conduct a job briefing with all employees involved. The briefing shall cover at least the following subjects: Job scope, hazards associated with the job, how to avoid the hazards (work procedures involved, special precautions, energy source controls, and personal protective equipment requirements), and your role in performing the work. <b>This job must be performed even if you are working alone.</b>
			Is the electrical equipment locked and tagged out (completely de-energized for this task)?
			Have you verified that all forms of energy have been isolated from the equipment? For electrical energy, you must first test your voltage detector for proper operation, verify that no voltage is present within the work area, and then test to see if your voltage detector is still working properly.
			Is there exposed, energized electrical equipment near the work area? If so, check the appropriate voltage range(s). _____ > 49 to 250 V    _____ > 250 to 600 V    _____ > 600 V
			Do I have the proper electrical personal protective equipment required to do the task? Proper electrical personal protective equipment must be acquired, when applicable, prior to the completion of the analysis and beginning the work, Electrical jobs may be split into tasks and a job hazard analysis performed for each task.
			Do I have the proper voltage rated tools and test equipment in proper working order to perform this task? Proper voltage rated tools and test equipment must be acquired, when applicable, prior to completion of the analysis and beginning the work.
			Is a permit required for this task? If so, which of the following permits is required for this task? _____ <b>Energized Electrical Work Permit</b> _____ <b>Confined Space Entry Permit</b> _____ <b>Other Documentation</b>
			Can I control my environment? You must have control of your environment prior to the completion of this analysis and beginning work. _____ Close working quarters                      _____ High traffic area _____ Flammable atmosphere                      _____ Wet or damp environment _____ Inability to control intrusion/distraction by others _____ Could drop a tool/component onto exposed, energized equipment/bus bars/conductors
			Do I understand that completing this job safely is more important than the need or pressure to complete this job? You must be able to answer this question "Yes" prior to the completion of this analysis and beginning work. If you have a problem answering this question "Yes", contact your supervisor or the Health & Safety department.
			Do I have any unresolved safety concerns about performing this task? You must be able to answer this question "No" prior to completion of this analysis and beginning work. If you have a problem answering this question "No", contact you supervisor or Health & Safety Department.

**NOTE: If you have checked any gray boxes, contact your supervisor or Health & Safety Department before working on this equipment.**

Employee's signature: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_



## IX.7 Appendix 7: Sample Safety Check Sheet

<b>Safety Check Sheet</b>	
Customer Name:	Site Name:
Substation Name:	Job No.:
Nominated Person:	
Telephone Number for Ambulance/First Aid:	
Telephone Number for Fire Department:	
Telephone Number for Emergency Services:	

	Check List	Yes	No	Comment
1	Is there safe means of escape in event of HV equipment failure?			
2	Is the scope of work documented and clearly defined?			
3	Do members of the work party have the competence to perform the scope of work?			
4	Have all members of the work party been issued with correct PPE for the scope of work?			
5	Has a risk review been undertaken to evaluate risks within the nearby vicinity and on the job?			
6	Does the risk assessment consider direct and indirect possibilities for re-connection of the circuit und work?			
7	Is work place clearly identified and demarcated?			
8	Is live equipment nearby the work place clearly identified?			
9	Does each member of the work party fully understand which circuits are live and which circuits are dead?			
10	During execution of the work is it planned to change any circuits from dead to live or vice versa? WARNING: If yes, then with <u>each</u> change: <ul style="list-style-type: none"> <li>• Demarcation and warning signs must be adjusted accordingly</li> <li>• Each member of the work party must fully understand which new circuits are now live.</li> </ul>			
11	Is the electrical equipment to be worked on disconnected and safely earthed (grounded)?			
12	Have adequate steps been taken to prevent re-connection?			
13	Can remote protection or control operation re-connect circuit under work?			
14	Are there any warning notices at all disconnection points?			
15	Has access to nearby live equipment been prevented through the positioning of barriers, locks, or other means?			
16	Have adequate safety measures been taken to prevent access to live low voltage conductors?			
17	Have voltage transformers been safely disconnected to prevent high voltage at the point of work being applied through energizing transformer low voltage side?			

	Check List	Yes	No	Comment
18	During preparation of the safe working area, will any member of the work party come close to live exposed conductors? WARNING: If yes, then special safety precautions must be taken during this activity.			
19	Has a voltage detection tester been used to verify that all points of work are dead?			
20	Has the voltage detection tester been checked for correct operation before and after use?			
21	Have earth (ground) been applied to all phases at the point of work?			
22	Are earth (ground) conductors and connections rated for maximum fault level at point of work?			
23	Is there a written Electrical Safety Permit to work?			

	<b>Additional checks for work on or near live equipment</b>			
1	Is scope of work approved by local service unit manager?			
2	Do members of the work party have correct PPE for the scope of work?			
3	Has a detailed risk assessment been undertaken?			
4	Do all members of the work party fully understand which parts of the equipment are live?			
5	Are all tools and test equipment functioning correctly and are calibrated?			

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

IX.8 Appendix 8: Sample Safety Permit to Work

<b>Electrical Safety Permit to Work</b>	
Customer/ Plant responsible person	
Contractor/ Nominated Person	
Plant / Control panel	
Location and scope of work to be executed	
<b>All parts of the electrical system, which are not addressed, are considered to be in live condition!</b>	

<b>1.</b>	<b>Authorization for Switching Operations</b>		
Date:	Time:	Name:	Signatures:
The customer (plant responsible person):			
If necessary the authorization is handed over to:			

<b>2.</b>	<b>Permission for Working</b>
The plant responsible person gives permission to the nominated person to execute above described work on the defined area/part of the plant.	
<ul style="list-style-type: none"> <li><b>1</b> Work place clearly identified</li> <li><b>1</b> Circuit disconnected and secured against re-connection</li> <li><b>1</b> Access to nearby live parts prevented</li> <li><b>1</b> Installation verified as dead</li> <li><b>1</b> Circuit correctly earthed (grounded)</li> </ul>	
Execution and confirmation by the plant responsible person and checked by the nominated person:	
Plant responsible person assigned:	Date:      Time:      Name:      Company:      Signature:
Nominated person took over:	Date:      Time:      Name:      Company:      Signature:

<b>3. Release to Start Work</b>					
The nominated person performs the workplace risk assessment, completes safety check sheet, and grants the release to start working.					
1 Site risk assessment completed			1 Safety check sheet completed		
Plant responsible person released:	Date:	Time:	Name:	Company:	Signature:
Instructed employees, own one's, and contractors	Date:	Time:	Name:	Company:	Signature:
	Date:	Time:	Name:	Company:	Signature:
	Date:	Time:	Name:	Company:	Signature:
	Date:	Time:	Name:	Company:	Signature:

<b>4. End of Work</b>					
Inspection and announcement of completion of described and executed work/evaluation of working area					
1 Remove all tools, equipment, and material 1 Uncover or remove protection of adjacent live parts 1 Remove earthing (grounding) and short-circuiting 1 Remove all locks or devices, which were used to prevent re-connection 1 Remove all signs used for marking the working area <b>From now on the installation is regarded as live!</b> 1 Inspection by nominated person if the installation is ready for re-energizing <b>Before re-energizing all people not needed have to leave the danger zone</b> 1 Nominated person hand over the installation to the plant responsible person 1 Re-connection by the person authorized for switching operations					
Nominated person assigned:	Date:	Time:	Name:	Company:	Signature:
Plant responsible person took over:	Date:	Time:	Name:	Company:	Signature:
<b>The released work space herewith has been energized!</b>					

Original: Nominated person  
 Original to be retained in job file

Copy1: Plant responsible person

IX.9 Appendix 9: Sample Energized Electrical Work Permit

**Energized Electrical Work Permit**

(To be completed by the requester) Check

Job location (customer name & location): \_\_\_\_\_ 1

Description of work to be performed: \_\_\_\_\_ 1

\_\_\_\_\_

Why equipment cannot be de-energized: \_\_\_\_\_ 1

\_\_\_\_\_

Description of safe work practices implemented: \_\_\_\_\_ 1

\_\_\_\_\_

Location of main disconnect (in case of emergency): \_\_\_\_\_ 1

CPR-trained stand-by person (required): \_\_\_\_\_ 1

Arc flashing rating of energized work area: 1 0 1 1 1 2 1 3 1 4 1

Personal protective equipment to complete the job: \_\_\_\_\_ 1

\_\_\_\_\_

Method(s) to restrict access: \_\_\_\_\_ 1

\_\_\_\_\_

\_\_\_\_\_

**Approval to perform the energized work described above**

Requester job	Title	Date
Electrically qualified person	Job title	Date
Service manager or management representative	<div style="display: flex; justify-content: space-around; font-size: small;"> <span>1 Yes</span> <span>1 No</span> <span>1 N/A</span> </div> Service manager contacted	Date