

## Electrical Hazards – Arc Flash Hazards

An arc flash hazard is defined as a dangerous condition associated with the release of energy caused by an electric arc. Arc flashes are explosive events that can result in severe injuries, burns, damage to the lungs, eardrums, and eyes, and even death. These incidents pose significant risks in industries involving electrical systems, such as substations, transmission lines, and underground cables, which are central to NCC T&D's operations.

### Conditions Leading to Arc Flash

Arc flashes can occur due to several factors, including:

- Accidental contact between two conductors.
- Wiring errors or improper installation.
- Deterioration or failure of insulation.
- Corrosion or contamination of equipment (e.g., dust, moisture).
- Animals, tools, or fallen parts causing short circuits.
- Poor or inadequate maintenance of electrical systems.
- Use of improper or non-rated tools by workers.
- Equipment failures, overloads, improper use, or human error.

### Hazard Control Measures

An electrical hazard is considered eliminated when protective measures are implemented at the source (e.g., de-energizing equipment) or along the path (e.g., installing insulation or barriers). If personal protective equipment (PPE) is the only control measure, the hazard is still considered present, and additional safety measures must be implemented to protect workers in the area.

### Regulatory and Safety Standards

In Saudi Arabia, electrical work on or near transmission and distribution systems must comply with the Saudi Electricity Company (SEC) Safety Rules and Saudi Aramco Electrical Safety Standards and relevant authorities. These regulations require:

- Work to be performed by authorized workers who are formally trained, competent, and approved by the employer and client.
- Use of industry-standard tools and equipment, such as voltage-rated tools, diagnostic equipment (e.g., multimeters, proximity testers), non-conductive ladders, and arc flash protective clothing.
- Proper labeling and signage for areas containing exposed energized parts, restricting access to authorized personnel only.

### Worker Responsibilities

- Workers must adhere to the following safety practices:
- Follow documented safe work procedures and practices.
- Use voltage-rated rubber gloves and leather protectors, ensuring they are inspected before each use and maintained according to manufacturer recommendations.
- Wear arc flash-resistant clothing and PPE that meets industry standards.
- Ensure the outer layer of clothing is made of flame-resistant material.
- Avoid wearing clothing that could increase injury risk (e.g., synthetic materials).
- Use approved eye protection in all situations where an electrical flash or arc is possible.

## Arc Flash Risk Assessment

To mitigate arc flash hazards, NCC T&D must conduct arc flash risk assessments for all electrical tasks. These assessments should:

- Evaluate the potential incident energy of equipment or devices.
- Establish safe approach boundaries for contact and arc flash hazards.
- Develop safe work procedures for electrical tasks.
- Ensure workers are trained to understand and apply these procedures.

## PPE and Equipment Requirements

- Rubber gloves rated for voltages above 5,000 volts AC must be tested and certified every three months if in service, or every six months if not in service.
- Arc flash protective clothing and equipment must meet recognized industry standards, such as NFPA 70E or equivalent Saudi standards.
- Tools and equipment must be designed, tested, and maintained to provide adequate protection against electrical hazards.

## Training and Competency

Workers exposed to electrical hazards must receive comprehensive training on:

- Proper use, care, and storage of PPE, including rubber gloves and arc flash clothing.
- Safe work practices and emergency response procedures.
- Identification and mitigation of electrical hazards.

## Additional Considerations for NCC T&D Projects

Given the high-risk nature of NCC T&D's operations, the following measures are recommended:

- Implement a robust maintenance program to prevent equipment failures and insulation deterioration.
- Conduct regular inspections of tools, equipment, and PPE.
- Promote a culture of safety by encouraging workers to report hazards and near-misses.
- Ensure all electrical work aligns with SEC and Saudi Aramco safety standards, as well as Saudi Arabian labor laws and HSE regulations.

For more information, refer to NCC T&D's relevant IMS procedures or consult our HSE Department for expert guidance and training resources aligned with Saudi Arabian regulatory requirements.