### Arc Flash Analysis
#### Electrical Safety Risk Assessment

**Prospective Incident Energy at Normal Working Distance**
(45 cm from Prospective Arc Source)

- **25 cal/cm²**
- **41.1 cm** (equivalent to 1.2 cal/cm²)

**Nominal Voltage:** 423.0 V

**Shock Boundaries**
- **I.S./B.S. EN50110-1**
  - **Live Working Zone:** 0 cm (Contact)
  - **Vicinity Zone:** 30 cm (Surrounding Bare Live Part)

**CAUTION:** Prospective incident energy may change if electrical network is altered

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**ARC FLASH & ELECTRIC SHOCK**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
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- **I.S./B.S. EN50110-1**
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WHAT IS ARC FLASH?

Electric Arc Flash is the release of energy in the form of intense heat and light, and in some events explosive pressure and sound waves. Arcing can be initiated upon 1) separation of electrical contacts (switches, circuit breakers, contactors, etc.), 2) arc faults (breakdown in dielectric strength between conductors caused by switching events, transients, overvoltages, etc.) and 3) short circuit faults.

Critically, Arc Flash accidents typically occur while equipment is being worked on or operated. This highlights the risks to those working on live electrical equipment, but also to those working nearby.

AND THE CONSEQUENCES

Arc Flash can have very serious, and sometimes catastrophic consequences for workers and business alike. Potential injuries include external burns (potentially irreversible, 3rd degree burns); internal burns and intoxication due to inhalation of hot, toxic gases; loss of sight due to flash (UV light) and heat; loss of hearing due to noise of blast; other physical trauma due to blast forces and resulting shrapnel; and post-traumatic stress.

Accidents resulting in injury and/or fatality can result in criminal prosecution, reputational damage, and civil claims for damages. Even a minor Arc Flash event will result in damage to the electrical network, down-time, and loss of production. It is also likely to give rise to loss of in-process materials, and attendant costs (remediation, disposal, etc.).

ARC FLASH – A LEGAL PERSPECTIVE

H&S legislation in Ireland and the UK imposes numerous duties on employers and the self-employed (contractors) in relation to Arc Flash and electrical safety in general. Here follows a few prominent duties.

Employers must ensure, so far as reasonably practicable, the safety, health and welfare at work of employees and any other persons who may be affected by their undertakings (Safety, Health & Welfare at Work Act 2005 in ROI, The Health and Safety at Work Act 1974 in UK). Notably, this general duty extends to the provision and maintenance of safe plant and systems of work, and also the provision of such information, instruction, training and supervision as is necessary. Arc Flash and other hazards associated with electricity at work must be managed in this context.

More specifically, employers must make a suitable and adequate assessment of the risks to H&S, and those include Arc Flash and other risks involving electricity, and to put in place the necessary preventive and protective measures (2005 Act in ROI, Safety at Work Regulations 1999 in UK).

Furthermore, persons engaged in any work activity involving electricity, must be competent to prevent danger (Safety, Health & Welfare at Work General Application Regs. 2007 Part 3 in ROI, Electricity at Work Regs. 1989 in UK). That means, not only to have appropriate technical knowledge, but also understanding of the hazards, risks and work precautions to be observed.

STANDARDS

Standards and Guides play a vital role in helping employers to fulfil their legal duties with regard to safety, health and welfare at work.

In the absence of an equivalent Irish, British or European Standard or Guide, Premium Power conducts Arc Flash hazard analyses in accordance with the globally-recognised IEEE 1584 Guide for Performing Arc Flash Hazard Calculations. In this way we calculate the prospective arc incident energy levels along electrical networks, and the corresponding Arc Flash boundary distances. This is a pre-requisite to Arc Flash risk assessment, as it provides essential inputs to the risk assessment process.

In recommending risk controls, Premium Power refers to all applicable Standards and Guides, such as IS/BS EN50110-1 Operation of Electrical Installations – Part 1: General Requirements, and Standards relating to electrical switchgear & control gear assemblies, PPE/equipment, etc.
Electrical Network Computer Model

VITAL STATS

<table>
<thead>
<tr>
<th>26</th>
<th>Work related fatal electrical accidents in Ireland.</th>
</tr>
</thead>
<tbody>
<tr>
<td>19,500°C</td>
<td>The temperature generated by an Arc Flash explosion.</td>
</tr>
<tr>
<td>80%</td>
<td>It is estimated that Arc Flash accounts for 80% of all injuries caused during electrical accidents.</td>
</tr>
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</table>

ABOUT PREMIUM POWER

Premium Power has provided Electrical Safety evaluations and solutions to industry since 2001. We have a staff of highly trained engineers who have experience in evaluating hazards and risks in industrial and utility environments.

Using proven methodologies and software tools, Premium Power engineers calculate the prospective Arc Flash incident energy levels, and provide guidance with regard to the assessment and elimination or reduction of Arc Flash risks for the protection of personnel and plant.

CHECKLIST

Before carrying out work on or near live equipment have you considered the following:

- Have you assessed all risks associated with the use of electricity at work, including Arc Flash risks?
- In assessing Arc Flash risks, have you calculated prospective arc incident energy and arc flash boundary distances?
- Have you documented results of risk assessments?
- Can you justify why equipment cannot be de-energized or the job deferred until the next scheduled outage?
- Has a detailed work procedure been established?
- Was proper management approval secured?
- Were proper tools and equipment used?
- Was the necessary PPE determined?
- Were the workers performing the tasks qualified to do so?

Premium Power can help you with each of these requirements. Ask our Electrical Safety team for guidelines or advice.
TOTAL TASK & CONTRACTOR MANAGEMENT

Managing your workers, contractors, permitting, documents management, single lines, LOTO, PPE, risk assessments and everything else associated with SAFELY working on electrical systems doesn’t need to be an onerous or time consuming task.

Would it help to have:
- All health and safety related paperwork in one place?
- An online and email system to approve contractors?
- An overview of live and scheduled work on site?
- Efficient and centralised Contractor Management system?

CORE SERVICES

Arc flash hazard and electrical safety services
Power quality studies and harmonic filtering solutions
Electrical system stability and reliability solutions
Energy and power monitoring system supply and integration

Ask us for a Demo on SafeSite

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