

## Safety Alert Arc Flash

Revision: 1.00

Document No: **IW-HSQE-SA-44**

Approved By: James Cullen

### 1. What Happened?

When an electrician re-energised a panel following the installation of 4 new Miniature Circuit Breakers (MCBs) an arc flash explosion occurred in the panel and a secondary fire ignited at another location in the building. The electrician sustained minor burns to his right hand and suffered from shock in the aftermath. The fire was extinguished with minimal property damage.

#### **Arc Flash:**

The arc flash explosion was caused by a short-circuit between 2 phases of the newly fitted 3-phase busbar. Due to the severity of damage to the panel it was not possible to establish exactly what caused the short circuit, however, failure to have end caps fitted on the busbars was identified as a contributory factor.

#### **Fire:**

The secondary fire was caused by lack of Discrimination in the treatment plant. Discrimination (or selectivity) is the selection of protective devices so that the device nearest to a fault will operate rather than any upstream device. The purpose is to ensure that the fault is isolated and supply is maintained to other parts of the installation without disruption. Each asset requires appropriate fuses on the ESB pole supplying power to the asset, the main incomer and in the building. When investigated after the incident the building fuses were found to be either incorrect or absent at 2 of the 3 required locations. Due to the non existent fusing arrangements – faults no matter how minor have the potential to become very significant and this was realised with the secondary fire in the plant.

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## 2. Immediate Actions

Arc Flash: The electrician immediately located the plant power isolation switch and shut it down.

Fire: Another operative extinguished the fire with an onsite CO2 fire extinguisher.

Both operators left the building and gathered at the site assembly point.

## 3. Further Actions

### Arc Flash:

Electrical works (excluding standard electrical maintenance) involve design and there are health and safety requirements which must be considered:

At a minimum the following must be in place:

- In advance of any modification to an electrical installation the design and condition of the existing electrical arrangements in a plant must be taken into consideration. Approval must be obtained from a competent person to ensure that that existing electrical installations can accommodate the proposed modification.
- Any issues or concerns raised by designers/engineers at the design stage must be taken into consideration when scoping the project and must be shared with the contractors developing the procedure. Where required, suitable remedial works/control measures must be put in place to address same.
- All work on electrical panels, including their re-energisation, requires a suitable documented procedure which must be complied with. It must at a minimum include the following:
  - Panel assessment to calculate arc flash potential energy.
  - The minimum required suitably rated arc flash PPE required for the job. This must be based on the panel assessment and/or safety file information and identified in the risk assessment/method statement.
  - Visually inspect control panel door to ensure the door can be secured in a closed position. Report any defective panel doors and ensure

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repair/replacement as required. This should be performed at the electrical inspection stage, prior to commencement of works.

- If the switch is located inside the panel (**issue on many older models in our plants**) this must be reported and, where possible, move to a suitable location at an adequate distance from the panel to prevent injury in the event of an arc flash occurring during re-energisation. This must be identified at the electrical inspection stage.
- The panel door must be closed prior to re-energisation of plant.
- The hazard of Arc Flash should be taken into account when working near live open panels or where switching is being carried out and appropriate risk assessment and controls put in place to avoid or mitigate against this risk.
- If it is not possible to close the panel door due to the location of the switch inside the panel, a suitable documented safe system of work must be in place to prevent injury in the event of an arc flash with the control panel door in the open position.
- Any panel modification must comply with the Low Voltage Directive (2014/35/EU).
- All plant and equipment must be installed as per manufacturer's recommendations e.g. Endcaps are to be fitted on the installation of all busbars.
- Pre-Connection Tests must be completed immediately prior to the commencement of work activity.
- Pre-Connection Tests (Earth Loop Impedance, Insulation Resistance & Continuity) must be completed. A Safe Electric Cert No.3 and a Test Record Sheet must be completed following all installations.

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### Secondary Fire:

- Section discrimination is to be examined and noted prior to any works progressing. Any remedial works required with regard to discrimination must be agreed in advance and incorporated in the programme of works.
- A buddy system must be employed for all 3 Phase Board modifications i.e. installing/removing 3ph MCB's & Starters. The buddy must be CPR trained.

## 4. Further Information

For further information on this safety alert please contact [hsqe@water.ie](mailto:hsqe@water.ie)

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### 5. Distribution list

Internal		
Asset Operations <input checked="" type="checkbox"/>	Asset Delivery <input checked="" type="checkbox"/>	Asset Management <input checked="" type="checkbox"/>
All IW Staff <input type="checkbox"/>		
Other Please Specify _____		

External		
Local Authority <input checked="" type="checkbox"/>	DBO <input checked="" type="checkbox"/>	Capital Contracts <input checked="" type="checkbox"/>
Relevant Framework Contractors Please Specify: Major Civils Major MEICA Minor MEICA R & M Civils R & M Mech & Elec.		
Other Please Specify _____		