Fagdag elsikkerhet i Havtils lokaler 11. september 2025

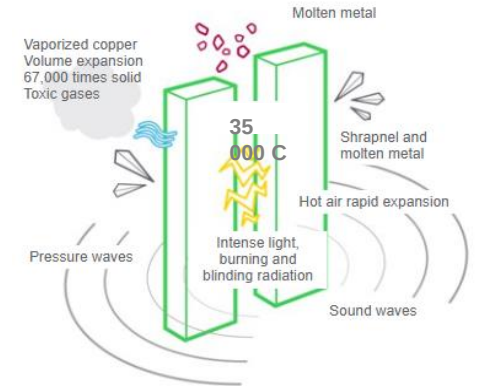
Schneider Electric

Arc flash

Igor Iskakov

Arc Flash protection and risk management

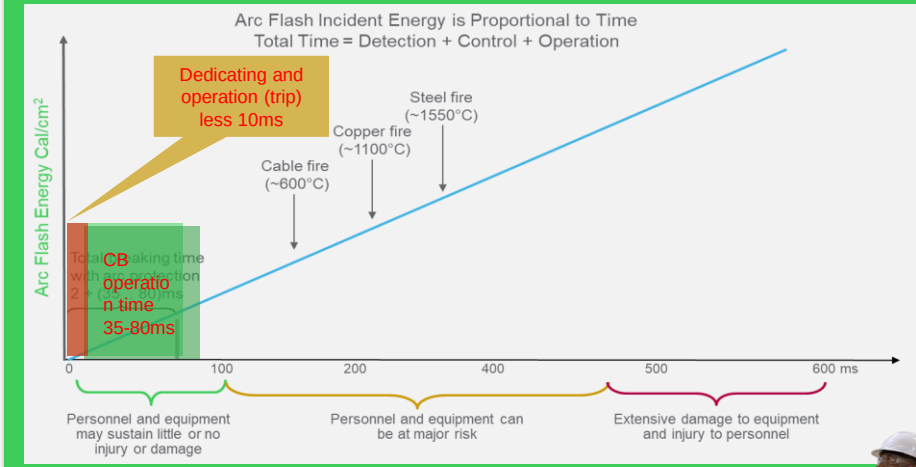
Arc Flash - Definition



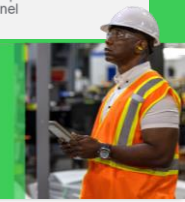
An arc flash is a phenomenon where a flashover of electric current, leaves its intended path and travels through the air, from one conductor to another, or to ground.

Incident energy measured in cal/cm^2

Arc flash can occur *regardless of voltage*



PowerLogic A1 and A3 Arc protection operation time
Outputs: HSO, 2 ms trip time, one trip relay output (T3, 9 ms trip time),



80%

accidents come from human error[1]

5-

incidents/day USA[2]

400

Fatalities

due to arc flash each year USA[3]

[1] *Human performance best practices in the electrical workplace: ESW2019-59*
[2] *Occupational Injuries From Electrical Shock and Arc Flash Events, NFPA 2015*
[3] *Industrial Safety & Hygiene, Editorial 2013*

Test the short current without arc protection

Result`s

Human life loss

Copper and metal burning in place of electric arc

Serious mechanical damage

Replacing all the damages equipment

Baseline: Icq 85 kA, Ue 440 V

Duration arc 300 ms

Test the short current with arc protection VAMP

Result`s

No Human life loss

Small mechanical damage

A short break in the electricity supply

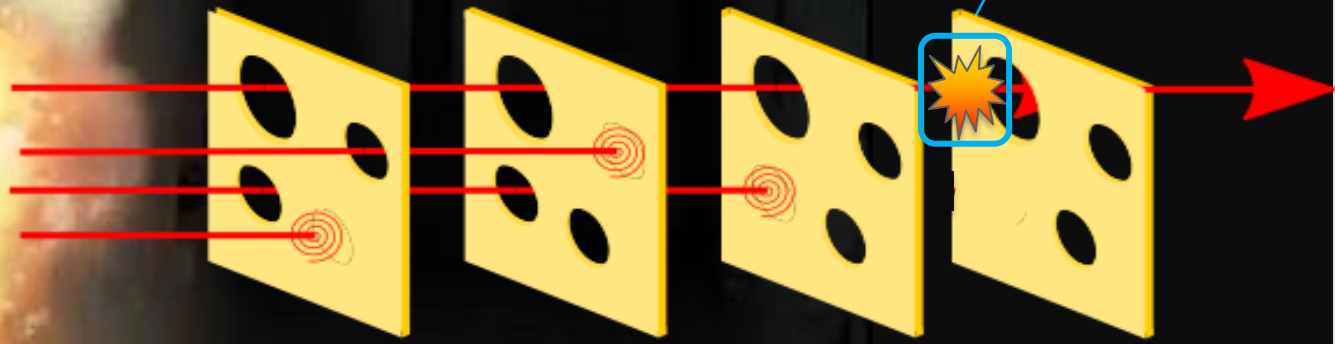
Low heat damage

Baseline: Icq 65 kA, Uf 440V

The duration of arc arc <2 ms

Arc Flash protection and risk management

Engineering controls	Administrative control	Behaviour control
• Desing of Switchgear • Safety equipment • Location of Switchgear • Other	• Safety instructions • Operation instructions • Process analysis • Other	• Routine job • Time schedule • Installation culture • Other



The model was originally formally propounded by James T. Reason of the University of Manchester

The Swiss cheese model of accident causation is a model used in risk analysis and risk management. It likens human systems to multiple slices of Swiss cheese, which have randomly placed and sized holes in each slice, stacked side by side, in which the risk of a threat becoming a reality is mitigated by the different types of defenses which are "layered" behind each other. Therefore, in theory, lapses and weaknesses in one defense (e.g. a hole in one slice of cheese) do not allow a risk to materialize, since other defenses also exist (e.g. other slices of cheese), to prevent a single point of failure.

Post-incident mitigation
• Emergency plan • Addition layers to safety process

Arc Flash protection and risk management

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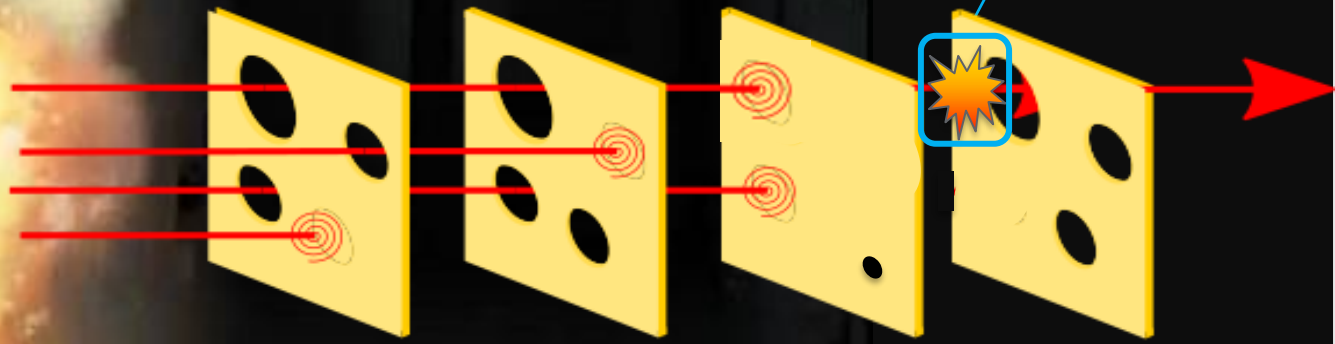

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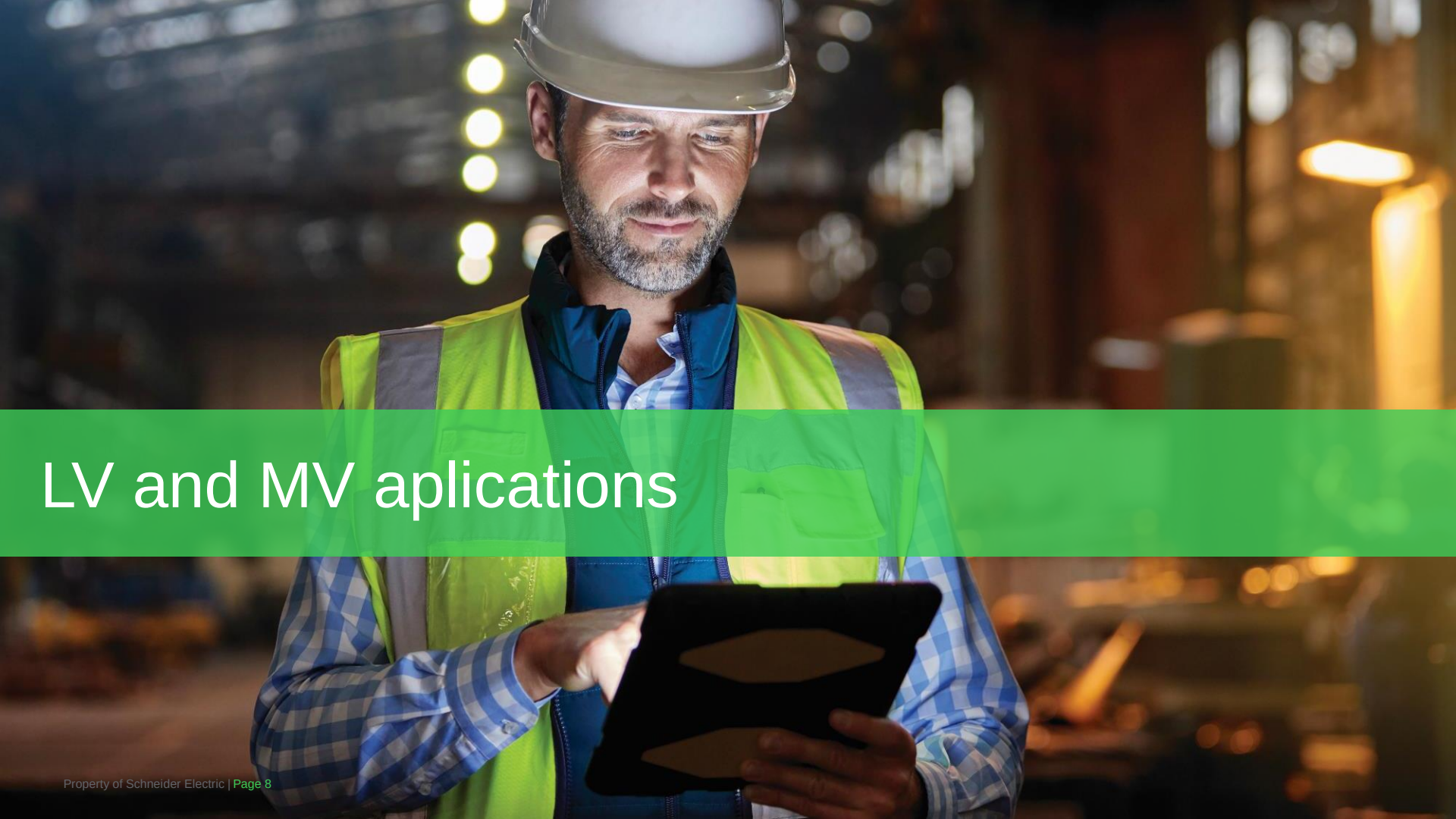
Addition layer Arc Flash protection	Post-incident mitigation
• Simple Arc flash protection • Advance fully selective Arc flash protection	• Emergency plan • Addition layers to safety process



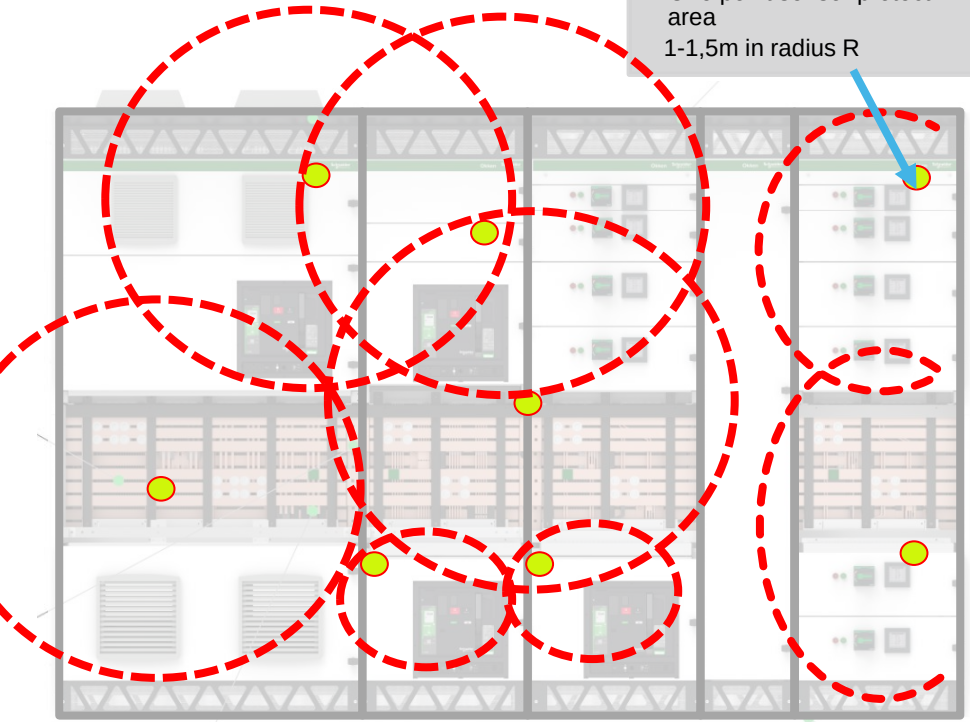
LV and MV aplications

LV switchgear protection

Pointt sensor and loop sensor

Point sensor

- One point sensor protect area
  1-1,5m in radius R



Arc Light Detection

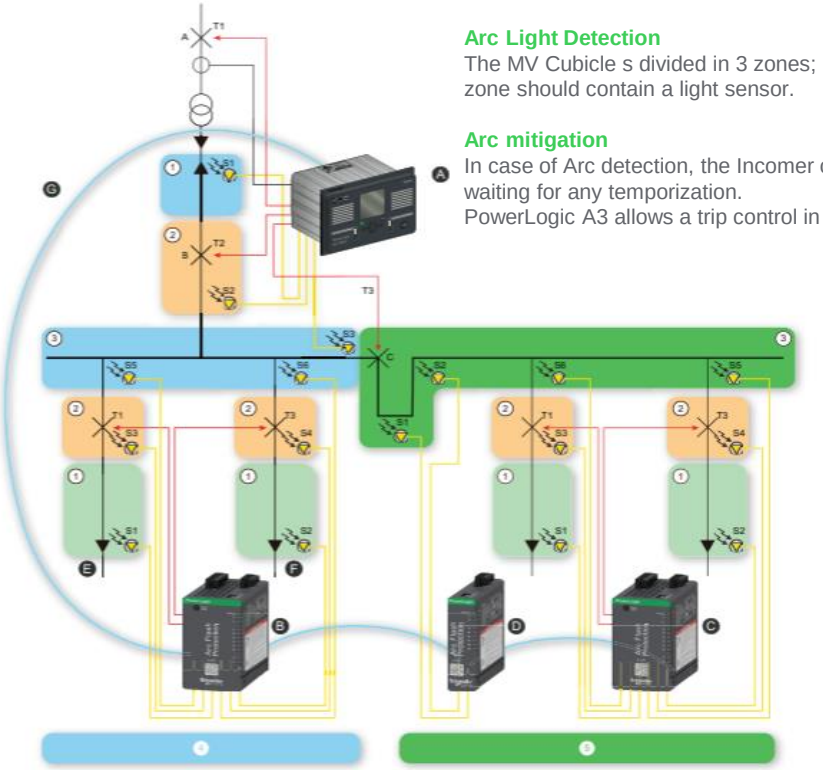
The LV in most cases have one protection zone.

Arc mitigation

In case of Arc detection, the Incomer circuit breaker should be switched complete LV panel. PowerLogic A3 allows a trip control in less than 2ms

MV switchgear protection

Pointt sensor and loop sensor

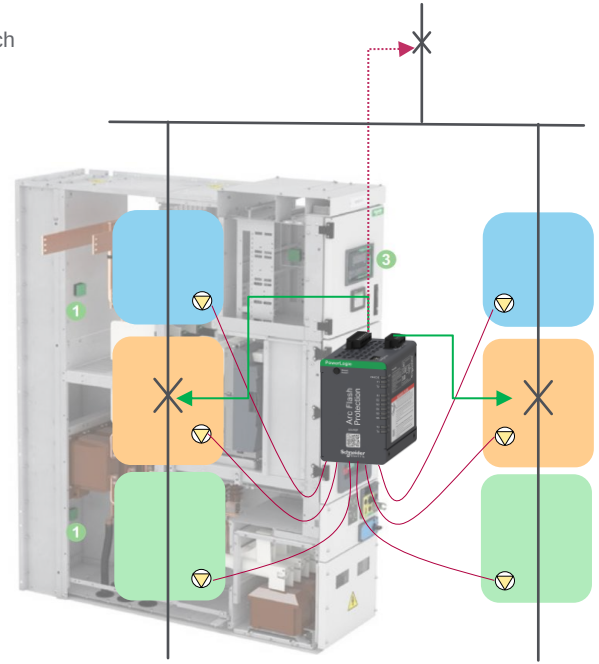


Arc Light Detection

The MV Cubicle s divided in 3 zones; Bus Bar, Switching and Cable zone. Each zone should contain a light sensor.

Arc mitigation

In case of Arc detection, the Incomer circuit breaker should be switched with waiting for any temporization.
PowerLogic A3 allows a trip control in less than 2ms



Real storys

Success stories of using Arc flash protection

Real example on wood sawmill

No customer name mentioned

During the Midsummer period, we carried out installation work involving the LV (Low Voltage) panel.
This factory had a reserved double panels, allowing for two panels to be used by one supplier. However, the original installation dated back to the 1970s and have not Arc flash protection. The second panel was reserved for activation after Midsummer, and the customer give permission to deinstall first LV panels, with following all necessary safety measures.

Throughout Midsummer, my team installed a new panel and laid new cables. After the holiday, work continued as planned, and the factory was scheduled to resume operations using old LV Panel. Unfortunately, an unexpected Arc flash incident occurred, causing old panel to blow, which led to a two-day production halt.
This incident resulted in additional costs for the factory due to lost income and increased the cost and urgency of completing the installation of LV Panel 2. This case highlights how Arc flash protection important for facilities continues production.

Used V221 Arc flash protection system

Unconfirmed approx. losses.
One-hour losses of papermill stop 10-30k€
Extra invoicing finishing of installation 2 days 10 000€
Approx. 0,6-1,5m€ losses in two days
No injuries

Real example
Car factory in EU

No customer name mentioned

In this situation, Schneider Electric delivered low-voltage switchgear that included a pre-designed arc flash protection system. Although the customer had not initially requested arc flash protection, our team proactively recommended it. The switchgear was successfully delivered and installed.

Approximately six months to a year later, the customer approached us with a request to retrofit all existing LV panels with arc flash protection. This decision was likely influenced by the performance and reliability of the protection system in the newly installed panel, which demonstrated its effectiveness of Schneider Electric Arc flash protection for the facility and personnel.

Following this, the customer decided to implement our arc flash protection solution across all voltage panels in the facility. This case highlights the value of Arc flash protection and how successful implementation can lead to broader adoption.

Used V321 Arc flash protection system

Unconfirmed approx. losses.
One-hour of car factory stay 0,6-1m€
No incident only success of Arc flash protection
Approx. loss if Arc flash was not used:
In one day of stopping production more 15-24m€

Real example
Oil company

No customer name mentioned

A similar case occurred where Schneider Electric delivered medium voltage (MV) panels with built-in arc flash protection and full selective protection to an Oil & Gas customer. Within less than a year, the customer requested in-depth training on arc flash protection. Following the training, the customer approved Schneider Electric's arc flash protection solution for all of their global installations.

Implementing arc flash protection significantly improved the reliability and continuity of their production processes.

Used V321 Arc flash protection system

Unconfirmed approx. losses.
One-hour of car factory stay 1-2m€
No incident only success of Arc flash protection
Approx. loss if Arc flash was not used:
In one day of stopping production more 24-48 m€

Thank you

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