Arc Quenching Magnum DS® Switchgear

Superior protection – in a flash


Oil and Gas


Industrial


Government


Water/Wastewater


Utility

Innovation in arc flash safety

Eaton continues to demonstrate leadership in electrical safety solutions with the introduction of an arc flash quenching system for low voltage applications. Eaton's Arc Quenching Switchgear advances the state-of-the-art for arc flash safety solutions by reducing incident energy to a level where the switchgear will survive an arc flash event, while providing enhanced safety and minimal equipment downtime.

Powering Business Worldwide

Arc Quenching Switchgear

Incident energy is the amount of energy, at a prescribed distance from the equipment, generated during an electrical arc event. It increases as available fault current and clearing time increase.

Incident energy from an arc flash event destroys electrical equipment, injures personnel and contributes to extended periods of downtime.

Eaton's Arc Quenching Switchgear drastically reduces incident energy to provide an unprecedented level of safety, switchgear protection and process uptime.

Incident Energy Reduction

Complies with NEC section 240.87

- Arc Quenching Switchgear detects and mitigates an arc flash in less than 4 ms
- Reacts more than 10 times faster than systems that rely on a circuit breaker to clear an arc fault, such as maintenance switches, ZSI, bus differential relaying and arc detection relays. A faster clearing time results in lower incident energy
- Reduces incident energy below 1.2 cal/cm^2 which may reduce PPE requirements.*
- May reduce arc flash boundaries
- Does not interfere with selective coordination

* For 480 V systems with 85,000 A of available fault current or less at a working distance of 18". End user to determine PPE requirements based on system, application and task.

Incident Energy Reduction
Reduced far below methods that rely solely on a circuit breaker to clear the fault

Enhanced Safety
Exceeds ANSI/IEEE C37.20.7 arc-resistant testing requirements

Switchgear Protection
Protects valuable switchgear assets from arc flash damage

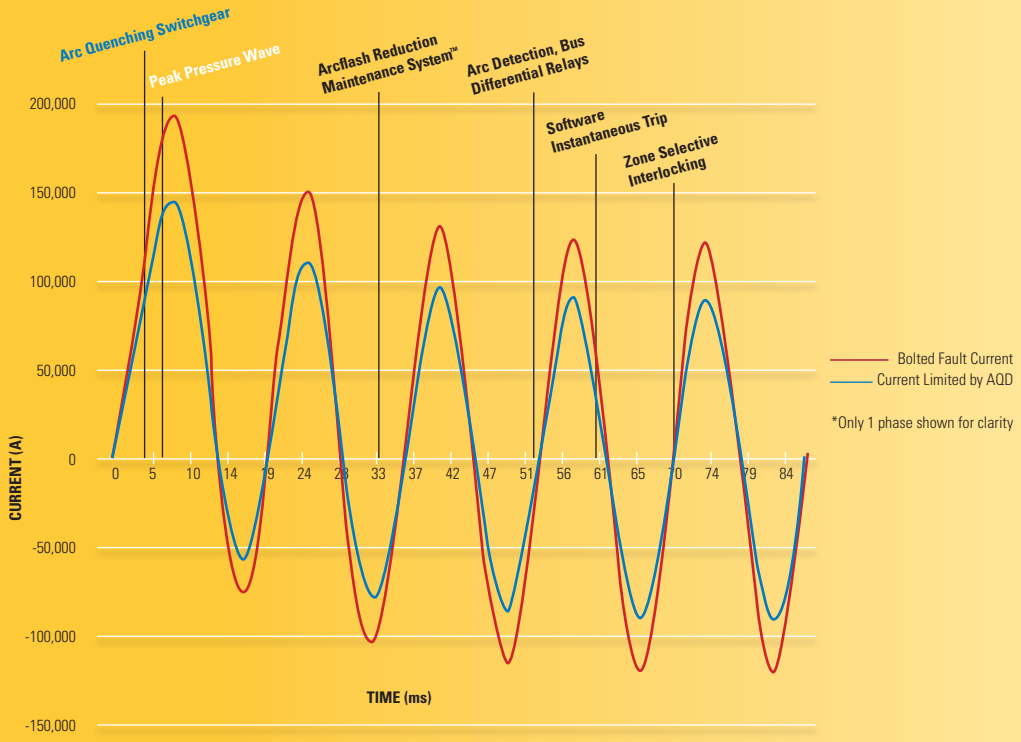
Reduced Downtime
Switchgear can be quickly returned to service after an arc flash event

Enhanced Safety

Safety is the highest priority

- Arc Quenching Switchgear is tested to the ANSI/IEEE C37.20.7 arc-resistant test guide and third-party listed by UL
- Exceeds testing requirements of C37.20.7 by demonstrating acceptance even when breakers are removed, doors are open and covers are removed
- No venting into the room. Heat, light and toxic arc gases are fully contained inside the Arc Quenching Device (AQD)
- Always-on protection - does not require special activation for maintenance activities

FAULT CURRENT AND ARC CLEARING TIME COMPARISON*



Arc Quenching Device

Switchgear Protection

Longevity and asset protection

- Traditional arc-resistant construction does not protect the switchgear from arc flash damage
- Arc Quenching System minimizes or eliminates damage to switchgear in the event of an arc flash
- Reduces peak fault current by at least 25% compared to the prospective bolted fault current
- Reduces peak stress on upstream equipment by at least 44% compared to the prospective bolted fault current

Reduced Downtime

Increased uptime and reduced risk

- Arc flash events can damage circuit breakers, compartments, structures and even the entire lineup leading to costly downtime
- Arc Quenching Switchgear minimizes or eliminates damage from an arc flash thereby reducing downtime from weeks or months to hours
- Restoring service is accomplished by returning the switchgear to normal operating condition and replacing the draw-out AQD
- Eaton Arc Flash Relay utilizes advanced algorithms to prevent nuisance operation of the AQD due to the light emitted from a power circuit breaker while interrupting a fault external to the switchgear

ARC QUENCHING SYSTEM SEQUENCE OF OPERATION

1 Arc flash event occurs. Flash and high current detected by light sensors and CTs.

2 Patented methods verify arc event versus light from normal air circuit breaker operation.

3 Eaton Arc Flash Relay simultaneously sends signals to the Arc Quenching Device (AQD) and main circuit breaker or upstream device.

4 Signal 1: AQD quenches the arc and contains arc energy.

5 Signal 2: Main LV breaker (or upstream MV breaker) opens, de-energizing the switchgear.

Arc quenched in <4 ms

Breaker trips within 67 ms

Standard features

- Tested to ANSI/IEEE C37.20.7, Type 2B test guide in NEMA 1 construction
- Arc Quenching Device (AQD) is a UL Recognized Component per UL 2748
- Arc Quenching Switchgear designed to UL 1558, ANSI C37.20.1, CSA C22.2 No. 31-10, and C37.51
- Short circuit withstand rating up to 85 kA at 635 Vac
- Short-time withstand current rating, 85 kA for 30 cycles
- <4 ms arc quenching time
- >25% reduction in peak fault current
- >44% reduction in peak system stress
- Complete system self-supervision with health status communicated via Modbus and dry contacts
- Available in rear access and front access switchgear configurations
- Anti-nuisance trip technology

Enclosure configurations

Arc Quenching Switchgear is available in various enclosure constructions to meet specific application requirements:

Traditional arc-resistant construction

- Active arc-resistant protection and incident energy reduction under normal operating conditions
- Traditional passive arc-resistant protection if the AQD is removed and arc-resistant breaker cell provisional cover installed

NEMA 1 construction

- Active arc-resistant protection and incident energy reduction without the need for ducts, plenums, or special enclosure construction
- Reduced installation costs and reduced overhead clearance requirements compared to traditional arc-resistant switchgear

NEMA 3R construction

- Industry-exclusive NEMA 3R arc-resistant protection
- Arc-resistant protection and incident energy reduction for outdoor switchgear

How the Arc Quenching Device works

When the AQD receives a trigger signal from the Eaton Arc Flash Relay, it produces a lower impedance arc in a controlled micro-environment within the Arc Containment Vessels located in the AQD. The lower impedance arc collapses the voltage and immediately extinguishes the unintended arcing fault as the current begins to flow into the AQD. This quenching operation occurs in less than 4 ms. The arcing continues safely contained inside the AQD until the upstream power circuit breaker trips.

Configuration comparison

	UL 1558 Metal-Enclosed	C37.20.7 Arc-Resistant	Passive System	Active System	Equipment Protection	Reduced Downtime
Arc-Resistant Switchgear + Arc Quenching System	•	•	•	•	•	•
Arc Quenching Switchgear	•	•		•	•	•
Arc-Resistant Switchgear	•	•	•			
Standard Switchgear	•					

To learn more about Arc Quenching Switchgear, visit: **Eaton.com/AQS** or contact your local Eaton sales representative.

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