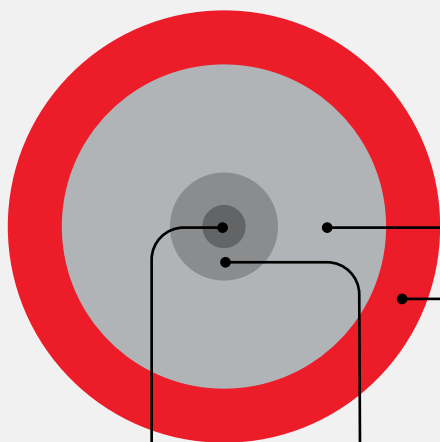


How to reduce electrical hazard risk

Multiple solutions for new and existing facilities



Being near live electrical equipment can be dangerous, whether from shock or arc flash hazard. ABB solutions exist to help reduce the risk associated with electrical hazards in a wide range of conditions and needs.

Sources
 U.S. Bureau of Labor Statistics — bls.gov
 National Safety Council — nsc.org
 U.S. Department of Labor Occupational Health and Safety Administration — osha.gov
 Canadian Centre for Occupational Health and Safety — ccohs.ca
 The Electricity Forum — electricityforum.com

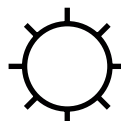


**Energized circuit/
conductor**



Electric shock

Exposure to electricity has resulted in an average of more than 150 fatal occupational injuries per year since 2011, according to the U.S. Bureau of Labor Statistics. Typical injuries caused by electric shock, whether fatal or non-fatal, are burns and abnormal heart rhythm, as well as loss of balance and/or consciousness, which can lead to further injury or death from a fall.



Arc flash

The National Safety Council defines arc flash as the luminous electrical discharge through the air that occurs when high voltages exist across a gap between conductors. An arc flash releases energy that can heat the air to nearly 35,000 °F — causing human skin and clothing within 3 feet to catch fire, melt or vaporize.



Arc blast

In an arc blast, the heated air caused by an arc flash expands suddenly and creates a powerful pressure wave with an explosive release of molten metal from the arc path. In addition to the heat, an arc blast involves sound levels that can lead to permanent hearing loss as well as ballistic threats from flying shrapnel and objects. According to the Electricity Forum, arc blast sends more than 2,000 North American electrical workers to burn centers each year.

How to reduce electrical hazard risk

- 01 ReliaGear LV SG switchgear
- 02 ReliaGear LV MCC motor control center with arc flash mitigation

Multiple solutions

Arc flash hazard risk is a function of fault clearing time at an arcing current and a worker’s distance from the event. Multiple techniques can be employed to limit risk. ABB offers a variety of products and services that help minimize risk in both new and existing facilities.



01



02



Products and services	Keep incident energy low	Prevent at-risk activities	Reduce probability of an event	Shield personnel
Switchgear and motor control centers				
ReliaGear® LV SG	•	•	•	
ReliaGear™ LV MCC with arc flash mitigation	•	•	•	
MNS MCC (arc-resistant)	•	•	•	•
MNS low voltage switchgear (arc-resistant)	•	•	•	•
SafeGear® arc-resistant medium voltage switchgear	•	•	•	•
SafeGear® arc-resistant medium voltage motor control center	•	•	•	•
Arc mitigation equipment				
Ultra-fast earthing switch (UFES)	•			
ArcLimiter™ active arc flash protection	•			
REA/TVOC-2 arc flash mitigation relays	•			
Relion® protective relays	•	•	•	
System monitoring and condition-based maintenance				
SwitchgearMD™ asset health monitoring		•	•	
ABB Ability™ energy monitoring		•	•	
Bluetooth® communications/EPiC (mobile phone app)		•	•	

ReliaGear LV SG switchgear

- Epoxy bus insulation, complete live bus and compartment isolation, compartmentalized control wiring and automatic shutter system help minimize arcing fault generation.
- Non-vented front panels reduce probability of arc effluent exiting towards operating personnel.
- Infrared port access, hinged equipment panels, control circuitry drawers and remote communications improve maintenance results.
- Fast, selective protection provided by Emax 2 circuit breakers and Ekip Touch/Hi-Touch trip units.
- Temporary extra-sensitive, faster protection (ERMS) (as fast as 25 ms) delivered by RELT (reduced energy let-through) settings with positive status indication.

ReliaGear LV MCC motor control center with arc flash mitigation

- Starters up to 600 A protected by current-limiting circuit breakers and motor circuit protectors help minimize incident energy.
- Fully compartmentalized horizontal bus, fully isolated vertical bus bars and optional insulated horizontal main bus help minimize risk of arcing energy.
- Electronic monitoring allows for advanced monitoring, diagnostics and communication capability, minimizing the need for hands-on maintenance.



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03 SafeGear arc-resistant medium voltage switchgear

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04 Ekip Touch trip unit



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03



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04

SafeGear® arc-resistant medium voltage switchgear and motor control center

Arc-resistant switchgear channels the energy released during an internal arc fault in ways that help minimize the potential for injury to personnel and damage to surrounding equipment. It is available with a footprint no larger than standard switchgear.

Ekip Touch/Hi-Touch trip unit Industry-leading capabilities optimize selectivity and mitigate arc flash hazards

- RELT settings with positive status indication can clear in as little as 1.5 cycles at 60 Hz with low voltage power circuit breakers, using the 2I protection. Ensures <8 calories up to 100 kA up to 600 V AC.
- Ekip 2K-3 RELT module activates the 2I protection in 2.5 ms.
- Settings adjustment and monitoring of the circuit breaker outside the arc flash boundary using the EPiC app via Bluetooth® connectivity.
- Instantaneous zone-selective interlocking allows for fast and sensitive protection as well as simultaneous selectivity up to 100 kA for mains and ties.
- Directional zone-selective interlocking.
- Digital zone selectivity can be provided with Ekip Link Ekip Com IEC 61850 to integrate the SACE® Emax 2 circuit breakers in a substation automation system.
- Dual settings provide the option to lower all protection settings.
- TVOC-2 arc monitoring system with RELT Ekip 2K-3 has a 45 ms breaking time.

Circuit breaker and trip unit test kits

Testing can put maintenance personnel at risk; not testing can imperil operating personnel and system reliability. ABB's fast, easy-to-use test kits can confirm trip and circuit breaker operation with minimal time and trouble, helping reducing risk to personnel and operations.

Remote racking device

With ABB's remote racking device, maintenance personnel can rack low voltage breakers in and out from as far away as 30 feet for greater arc flash protection. It easily connects to the Emax 2 low voltage circuit breaker and the medium voltage ADVAC® and AMVAC circuit breakers.

Arc flash hazard analysis

Understand your potential risk by performing an arc flash hazard analysis in your facility. ABB's comprehensive arc flash hazard study, designed to assist in addressing the recommendations of the National Fire Protection Association's (NFPA) Standard 70E, helps promote employee safety from dangers associated with the release of energy caused by an electrical arc. Key elements of an arc flash hazard analysis include:

- Calculating short circuit current, arcing current, incident energy and arc flash protection boundary.
- Identifying areas that pose unacceptable risk and suggesting protection improvements.

Applying experience

Drawing on over 100 years of experience in analyzing power systems, ABB supports the quantification of arc flash hazards throughout your systems via data collection methods, detailed calculations and thorough software-based analysis to calculate the arcing current and incident energy.

Industry leadership

Through continuous research, product development, technical publications and industry support, ABB helps lead the way in arc flash hazard reduction by:

- Continuously conducting field surveys to address concerns that relate to arc flash protection.
- Investing in research and development of products that help reduce the risks of arc flash.
- Supporting industry-wide efforts, such as ABB's sponsorship and participation in Plant Engineering's Arc Flash University and IEEE events.
- Offering training on NFPA70E and electrical safety.



Contact us

For more information about Electrification Services, call toll-free +1 888 434 7378 or visit electrification.us.abb.com/services. For more information on ABB products, contact your ABB representative.