Contact Rozel for your Electrical Safety Training Needs

ELECTRICAL HAZARD BOUNDARIES

Rozel
www.70eConsultants.com

FLASH PROTECTION

(for when an increased likelihood of injury from an arc flash hazard exists
i.e. "not normal operation" or high incident energy equipment)

ARC FLASH BOUNDARY

The energy (cal/cm2) available at the working distance is indicated on the label. Use this value to choose flash PPE. The above pictures are examples.

WORKING DISTANCE (NORMALLY 18")

The energy (cal/cm2) available inside the working distance is greater than indicated on the label.

All parts of your body in this boundary must be protected from shock. Only qualified persons allowed.

VOLTAGE RATED TOOLS ONLY

2nd or 3rd degree burns are possible inside the arc flash boundary

SHOCK PROTECTION

(for ***exposed & energized*** conductors)

RESTRICTED APPROACH BOUNDARY

NO un-qualified persons unless continuously escorted by a qualified person.

LIMITED APPROACH BOUNDARY

Approach Boundaries

Nominal Voltage	Limited (exposed fixed circuit part)	Restricted
50VAC - 150VAC	42 inches (3'-6")	Avoid Contact
151VAC - 750VAC	42 inches (3'-6")	12 inches (1')
751VAC - 15,000VAC	60 inches (5')	26 inches (2'-2")

Operating a circuit breaker or switch for the first time after installation or completion of maintenance in equipment requires additional protective measures i.e. appropriate PPE

cal/cm2	RECOMMENDED PPE FOR FLASH & SHOCK
less than 1.2	Long Sleeve Natural Fiber, i.e. 100% cotton Shirt and Pants, Safety Glasses or Goggles, Hard Hat, Hearing Protection, Rubber Insulating Gloves as Required, Leather Gloves (as needed), Leather Footwear (EH).
1.2 and greater up to 8.0	Clothing with an arc rating greater than the incident energy. i.e. Long-Sleeve Shirt and Pants, Hard Hat with **Face Shield & Balaclava (or hood)**, Safety Glasses or Goggles, Hearing Protection, Rubber Insulating Gloves with Leather Protectors, Leather Footwear (EH).
8.0 and greater up to 40.0	Clothing with an arc rating greater than the incident energy. i.e. **Arc Flash Suit, Hood,** Hard Hat, Safety Glasses or Goggles, Hearing Protection, Rubber Insulating Gloves with Leather Protectors, Leather Footwear (EH).
greater than 40.0	Danger! Wear PPE rated for the available incident energy at the corresponding working distance. There is an increased likelihood of injury from an arc flash while working on this equipment.

GLOVE CLASSES FOR COMMON VOLTAGES

Class 00
Max Use 500VAC / 750VDC
Tested 2,500VAC / 10,000VDC
Label Color: Beige

10 MANUFACTURER / BRAND
ANSI / ASTM MADE IN D120
CLASS 00 COUNTRY TYPE I
MAX USE VOLT 500V AC

Class 0
Max Use 1000VAC / 1500VDC
Tested 5,000VAC / 20,000VDC
Label Color: Red

10 MANUFACTURER / BRAND
ANSI / ASTM MADE IN D120
CLASS 0 COUNTRY TYPE I
MAX USE VOLT 1000V AC

Class 0 is recommended for work with 480VAC (not Class 00)

Class 1
Max Use 7,500VAC / 11,250VDC
Tested 10,000VAC / 40,000VDC
Label Color: White

10 MANUFACTURER / BRAND
ANSI / ASTM MADE IN D120
CLASS 1 COUNTRY TYPE I
MAX USE VOLT 7500V AC

Class 2
Max Use 17,000VAC / 25,500VDC
Tested 20,000VAC / 50,000VDC
Label Color: Yellow

10 MANUFACTURER / BRAND
ANSI / ASTM MADE IN D120
CLASS 2 COUNTRY TYPE I
MAX USE VOLT 17000V AC

Glove Size — Circumference around hand in inches.
Max Use Volt — Maximum voltage allowed. (do not confuse with test voltage)
Rubber Type — Type I glove is not ozone-resistant. Type II is ozone-resistant.

WARNING

ARC FLASH AND SHOCK HAZARD

FLASH PROTECTION
< 1.2 cal/cm^2 Flash Hazard at **18 inches**

Arc Flash Boundary **18 inches**
Available Fault Current **29.62 kA**

(FOR WHEN AN INCREASED LIKELIHOOD OF INJURY FROM AN ARC FLASH HAZARD EXISTS)

SHOCK PROTECTION
480 VAC

Glove Class **0**
Limited Aprch. Boundary **42 inches**
Restricted Aprch. Boundary **12 inches**

(FOR EXPOSED ENERGIZED CONDUCTORS)

Recommended PPE for Flash and Shock:
Long Sleeve Natural Fiber, i.e. 100% cotton Shirt and Pants, Safety Glasses or Goggles, Hard Hat, Hearing Protection, Rubber Insulating Gloves as Required, Leather Gloves (as needed), Leather Footwear (EH).

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Contact Rozel for arc flash evaluation report and electrical hazard label questions or when major modification or renovation takes place. **Evaluations should be reviewed periodically, at intervals not to exceed 5 years.**

How to Read an Arc Flash and Shock Hazard Label

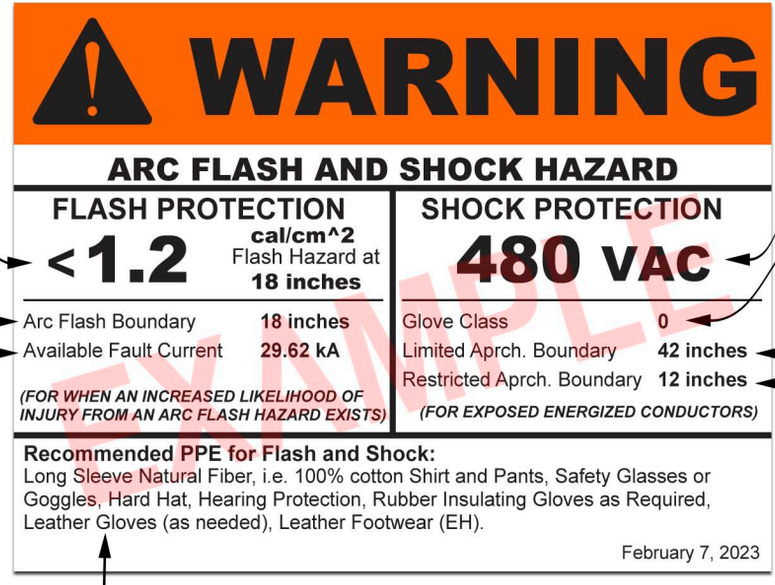
Labels are divided into two parts: Arc Flash and Shock Hazard
Equipment with these labels has the potential to produce both flash and shock injuries

Flash Protection
(for when an Increased Likelihood of Injury from an Arc Flash Hazard Exists)

Amount of thermal energy available at the working distance which is generated during an arc flash. Wear PPE rated to at least this calorie rating when within the Arc Flash Boundary (including testing for the absence of voltage).

Arc Flash Boundary
Distance from the source that a person could receive a second degree burn if a flash occurred. **All parts of your body in this boundary must be protected from flash.**

Available fault current supplied from the device's source (typically used for service equipment or non-generic labels)



A recommended list of PPE for Shock and Arc Flash that should be worn when working on equipment that is not placed in an electrically safe work condition.

Shock Protection
(for Exposed Energized Conductors)

Nominal voltage of the labeled equipment

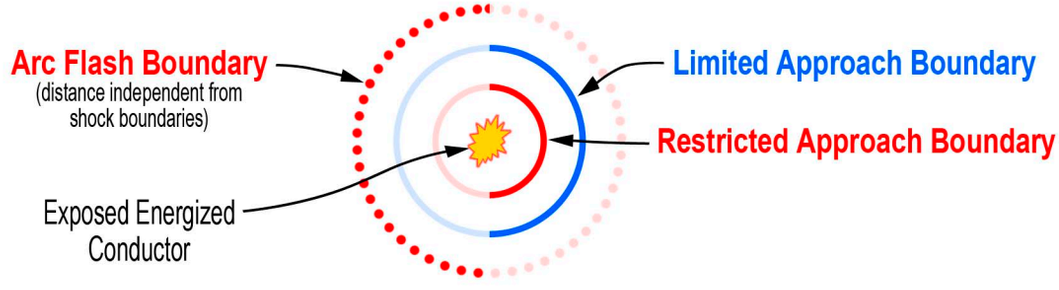
Minimum glove rating (Voltage Dependent)

Limited Approach Boundary
Minimum distance that unqualified persons must remain unless advised and continuously escorted by a qualified person. A shock hazard exists within this boundary due to an exposed energized electrical conductor or circuit part.

Restricted Approach Boundary
All parts of your body in this boundary must be protected from shock, equipment must also be voltage rated. Only qualified persons allowed. Within this boundary there is an increased likelihood of electric shock, due to electrical arc-over combined with inadvertent movement.

Definitions:
Arc Flash – An explosion caused from an uncontrolled electrical arc. Human interaction including live work such as testing or troubleshooting are typical causes of an arc flash. The explosion can be of varying severity depending on the power supplied and the upstream breaker or fuse.
NFPA 70E – National Fire Protection Association Standard for Electrical Safety in the Workplace – 2021 Edition
PPE – **P**ersonal **P**rotective **E**quipment

Arc Flash Boundary



Shock Boundaries

Only Qualified Persons may work on or near equipment with an exposed conductor
If you are unsure whether or not you are qualified then you most likely are NOT qualified