



Product Catalog

Fuse Terminology

COOPER Circuit Protection



Ambient Temperature*

The temperature of the air surrounding the fuse.

Arcing Time

The amount of time that passes from the instant the fuse element or link has melted until the overcurrent is interrupted or cleared.

Asymmetrical Current

Refer to ALTERNATING CURRENT. A-C current is asymmetrical when the loops about a zero axis are unequal (offset). This condition is usually associated with the first five or less cycles of fault current flow in a circuit that has inductive reactance. All power distribution systems have a variable amount of inductive reactance.

Body*

The part of the fuse which encloses the fuse elements and supports the contacts. Also referred to as cartridge, tube or case.

Bolted Fault

This refers to a zero impedance fault considered at locations in a power system where the maximum value of available fault current is calculated.

Bridge

The specially designed narrow portion of a fuse link that heats fastest under overcurrent conditions to open first.

Cartridge Fuse*

A fuse consisting of a current responsive element inside a fuse body with contacts on both ends.

Cartridge Size*

The range of voltage and ampere ratings assigned to a cartridge of specific dimensions and shape.

Clearing I²t (Ampere Squared Seconds)*

The measure of heat energy developed as a result of current flow between the time that current begins to flow and until the fuse clears the circuit. "I²" stands for the square of the effective let-through current and "t" stands for the time of current flow in seconds. The term I²t also applies during the melting or arcing portions of the clearing time and is referred to as melting or arcing I²t respectively. Clearing I²t is the sum of melting I²t and arcing I²t.

Clearing Time

This is the total opening time of a fuse from the occurrence of an overcurrent until the fuse stops current flow. This is the sum of link melting and arcing time.

Contacts*

The external metallic parts of the fuse used to complete the circuit. Also referred to as ferrules, caps, blades or terminals.

Current Limitation

A fuse provides current limitation when the link melts under short-circuit conditions to interrupt the current flow before the peak of the first one-half cycle of prospective current and the current flow is stopped within one-half cycle.

Current-Limiting Fuse*

A fuse that meets the following three conditions: 1) interrupts all available overcurrents within its interrupting rating; 2) within its current-limiting range, limits the clearing time at rated voltage to an interval equal to, or less than, the first major or symmetrical current loop duration; and 3) limits peak let-through current to a value less than the available peak current.

Current-Limiting Range*

A range of available currents from the threshold current to the interrupting current rating of a fuse.

Current Rating*

The A-C or D-C ampere rating which the fuse is capable of carrying continuously under specified conditions.

Delay

This refers to intentional "delay" designed into the overload range operation of a fuse and is meaningless except as defined by a fuse manufacturer. Other words used to indicate delay but not UL defined may be "Time-Lag", "Delay Type", etc..

Dual Element Fuse

The words "Dual Element" and "Time-Delay" appear on the labels of Class R fuses to indicate that the fuse has UL defined delay in the overload operation range of a minimum of 10 seconds at 500% of the fuse amperes rating. A "Dual Element" fuse has separate overload and short-circuit elements and is considered a "true time-delay fuse" design as opposed to other types of construction to obtain delay.

Effective Current (I_e)

"Effective" and "RMS" both refer to the heating effect value of an A-C current equivalent to a steady flow of a D-C current. "Effective let-through amperes" (I_e) refers to the heating effect value of the current allowed to flow during the clearing of a short-circuit current.

Eutectic Alloy

This is an alloy of lead, tin and other metals that, by metallurgical definition, changes from a solid directly to a liquid when its melting point is reached. This alloy is used in Edison Class R fuses for dependable overload element operation.

Fast-Acting Fuse

This is a fuse with no intentional time-delay designed into the overload range. Sometimes referred to as a "single element fuse" or "non-delay fuse".

Fault Current

Short-circuit current that flows partially or entirely outside the intended normal load current path of a circuit or component. Values may be from hundreds to many thousands of amperes.

Ferrule

The cylindrical brass, bronze or copper mounting terminals of fuses with amps ratings up to 60 amperes. The cylindrical terminals at each end of a fuse fit into fuse clips.

Filler*

A material used to fill a section or sections of a fuse which aids in arc extinction.

Fuse*

A protective device which opens by the melting of a current sensitive element during specified overcurrent conditions.

Heat Sink

A mass of metal, usually copper or a eutectic alloy, used in the overload element of Class R fuses to provide accurate time delay by absorbing heat from an overload current flow through a fuse.

High Rupturing Capacity (HRC)

HRC is used by Canadian and British Standards as an equivalent to the U.S. interrupting rating of a fuse. HRC must be at least 100,000 amperes.

*From ANSI/ NEMA FU1-86

I²t (Amperes Squared Seconds)

This is a value obtained by multiplying an effective current squared by the time of flow of the current in seconds. It is not a heat energy value, but represents heat energy for comparison purposes. Some common uses are to determine fuse selectivity and to select current limiting fuses that will limit this value to be compatible with the withstandability of semi-conductors that have an I²t rating.

Interrupting Rating*

A rating based upon the highest rms alternating current or direct current which the fuse is required to interrupt under specific conditions.

Knife Blade

A flat copper mounting blade (terminal) at each end of fuses rated 70 through 6000 amperes. Knife blades may be mounted in fuse clips or bolted in place via blade holes, depending on the fuse type.

Limiter

Limiters have internal construction like fuses but provide only short-circuit protection and no overload protection. They are intended for special applications such as Cable Limiters and Welder Limiters.

Link

The fusible portion of the fuse which melts, or reacts by other means, to clear the circuit during an overcurrent condition. Also referred to as an element.

Magnetic Stress

When thousands of amps of short-circuit current flows through equipment and conductors, strong magnetic fields are developed that may cause serious damage unless adequate physical bracing is applied. Force is proportional to the value of peak current squared. This force is usually reduced by current limiting fuses as compared to other overcurrent protective devices.

Maximum Energy*

A condition under which, in a specified time, the maximum amount of heat possible is generated in the fuse before clearing.

Melting Time*

The time from the initiation of an overcurrent to the instant arcing begins inside a fuse.

Nonrenewable Fuse*

A fuse which cannot be restored for service after operation.

Normal Frequency Recovery Voltage*

The normal frequency rms voltage impressed upon the fuse after the circuit has been interrupted and after high frequency transients have subsided.

One-Line Diagram

An electrical diagram that shows one line to represent two or more conductors for simplification.

One-Time Fuse

A term used to identify a non-renewable Class H fuse as opposed to a Class H fuse with replaceable links. See "non-renewable fuse".

Overcurrent*

Any current in excess of the fuse current rating.

Overload

A value of overcurrent usually considered to be up to about 10 times the ampere rating of an overcurrent protection device or circuit ampere rating.

Peak Arc Voltage*

The maximum peak voltage across the fuse during the arcing time.

Peak Let-Through Current (I_p)*

The maximum instantaneous current through a fuse during interruption in its current-limiting range.

Rating*

A designated limit of operating characteristics based on definite conditions.

Rejection Feature*

The physical characteristic of a fuse and fuseholder (slot, groove pin or overall dimension) which prevents substitution by other classes of fuses.

Renewable Fuse*

A fuse which can be readily restored for service after operation by the replacement of the renewal elements.

Renewal Element (Renewal Link)*

That part of a renewable fuse that is replaced after each interruption to restore the fuse to operating condition.

Short-Circuit Current

Refer to Fault Current.

Single-Element Fuse

Refer to Fast-Acting Fuse.

Supplemental Fuse (UL)

A UL fuse class per Standard 198G that defines certain small fuses not intended for branch circuit protection.

Thermal Stress

Heat builds up in equipment and conductors during the time of overcurrent flow that may cause thermal stress and potential thermal (heat) damage if overcurrent protection devices do not operate fast enough.

Threshold Current*

The minimum rms symmetrical available current of the current-limiting range, where melting of the fuse element occurs at approximately 90 degrees on the symmetrical current wave, and total clearing time is less than one-half cycle.

Threshold Ratio*

The threshold current divided by the fuse current rating.

Time-Delay Fuse*

A fuse capable of carrying a specific overcurrent for a minimum time.

Total Clearing Time*

Refer to Clearing Time.

Voltage Rating*

The maximum rms ac voltage or the maximum dc voltage at which the fuse is designed to operate.

*From ANSI/NEMA FU1-86