Fuses

A fuse consists of a metal strip or a wire fuse element of small cross-section in comparison to the circuit conductors, and is typically mounted between a pair of electrical terminals. Normally, the fuse is enclosed by a non-conducting and non-combustible housing. The fuse is arranged in series which can carry all the current passing all through the protected circuit. The resistance of the element generates heat due to the current flow. The construction and the size of the element is empirically determined in order to make certain that the heat produced for a normal current does not cause the element to reach a high temperature. In cases where too high of a current flows, the element either rises to a higher temperature and melts a soldered joint inside the fuse that opens the circuit or it melts directly.

Whenever the metal conductor parts, an electric arc is formed between un-melted ends of the fuse. The arc starts to grow until the required voltage in order to sustain the arc is in fact greater as opposed to the circuits accessible voltage. This is what leads to the current flow to become terminated. Where alternating current circuits are concerned, the current naturally reverses direction on each cycle. This method significantly enhances the speed of fuse interruption. When it comes to current-limiting fuses, the voltage needed to sustain the arc builds up fast enough to essentially stop the fault current before the first peak of the AC waveform. This effect greatly limits damage to downstream protected units.

The fuse is normally made out of silver, aluminum, zinc, copper or alloys as these allow for stable and predictable characteristics. The fuse ideally, would carry its current for an indefinite period and melt fast on a small excess. It is essential that the element should not become damaged by minor harmless surges of current, and should not oxidize or change its behavior subsequent to possible years of service.

So as to increase heating effect, the fuse elements could be shaped. In big fuses, currents may be divided between multiple metal strips. A dual-element fuse may included a metal strip which melts right away on a short circuit. This particular kind of fuse may also contain a low-melting solder joint that responds to long-term overload of low values as opposed to a short circuit. Fuse elements can be supported by nichrome or steel wires. This will make certain that no strain is placed on the element however a spring may be integrated to be able to increase the speed of parting the element fragments.

The fuse element is normally surrounded by materials which work to speed up the quenching of the arc. A few examples comprise air, non-conducting liquids and silica sand.