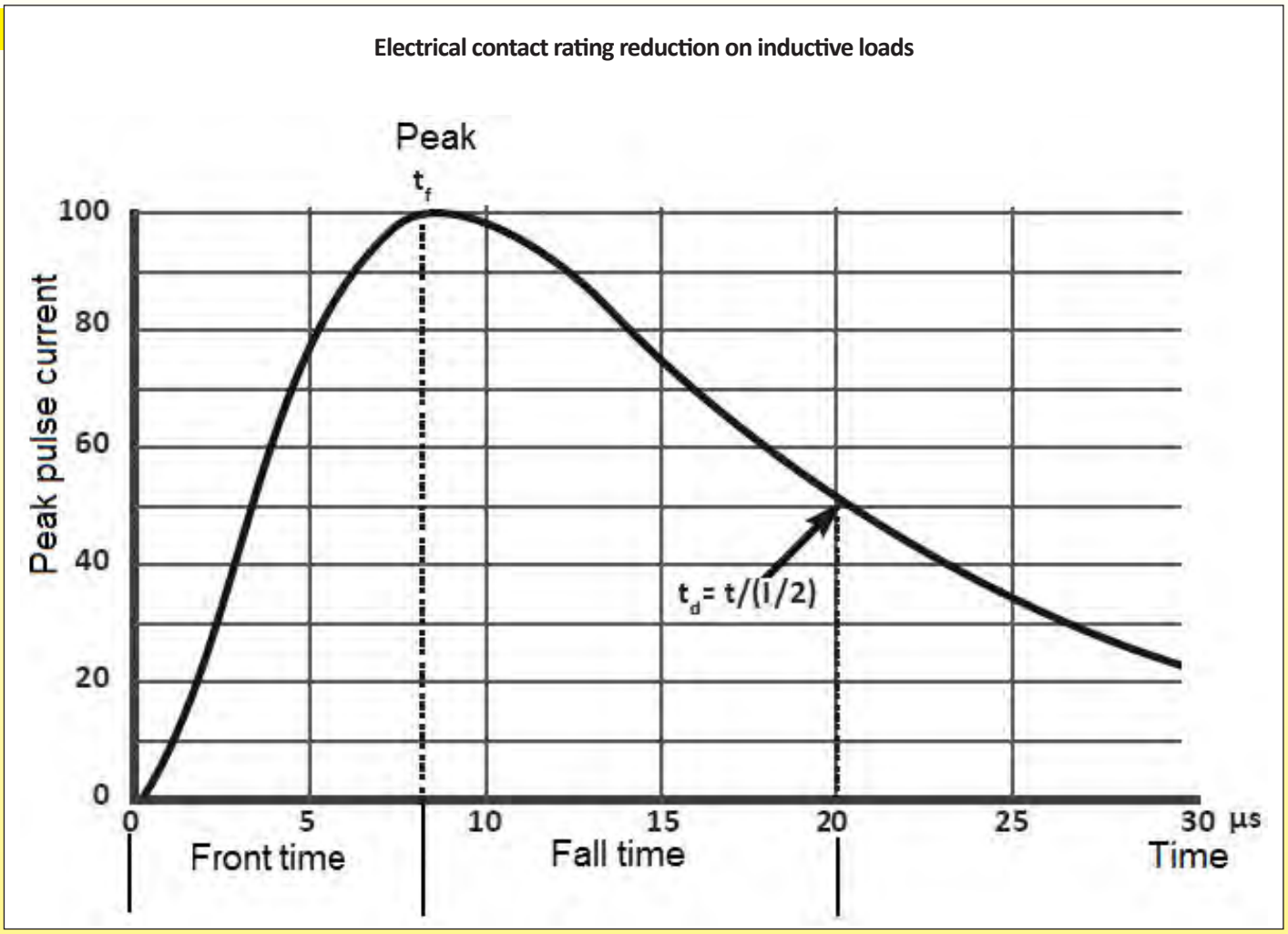

Overvoltage peak on inductive load circuits

When a switch breaks an inductive load, a fairly high counter electromotive force (counter emf) is generated in the switch's contact circuit. The higher the counter emf, the greater the damage to the contacts.
The quantity of electrical current which flows through the contact directly influences the contact's life. Impulse voltage is the critical value which the switch must withstand when the voltage surges momentarily due to switching an inductive load. They generate a current surge wave, witch form has generally a pulse width of 20 to 50 µs. Surge pulse rating is specified by its intensity and its width. Pulse width is time measured from pulse start to decrease to 50% of its maximum current value.
Figure shows a 8/20µs rated curve.

Motors loads impulse voltage:
During start-up, a motor can pull 600% or more of its running current. Thus, a 3 amp motor may actually pull 18 amps or more during start-up. Additionally, when disconnected, a motor acts as a voltage generator as it slows to a stop. Depending on the motor, it can feed back into the circuit voltage well in excess of rated line voltage. These voltages appearing across the separating contacts can cause a destructive arc to exist between the contacts, which can lead to early failure of the contact

Lamp loads impulse voltage:
A tungsten filament lamp, when filament is cold, has an initial inrush current of 10 to 15 time the nominal current.

Transformers inductive loads:
When power is removed from a transformer, its core may contain remanent magnetism. If power is reapplied when voltage is of the same polarity as that of the remanent magnetism, the core may go into saturation during the first half-cycle of reapplied power. As a result, inductance will be minimal and an inrush current of perhaps 1,000% may exist for a few cycles until the core comes out of saturation. Also, as with motor loads, when power is removed from a transformer, the transformer will develop a counter voltage which can cause a destructive arc to exist between separating contacts.

Distributed line capacitance loads:
This occurs when a switch is located a considerable distance from the load to be switched. The instant the contacts close, distributed line capacitance charges before load current flows. This capacitance can appear as an initial short circuit to the contacts, and can pull a current well in excess of load current.

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