Table 57-III Derating factors for relays

Part Type	Derating Parameter	% of Resistive Load Rated Value in Environment		
		Category 1 Protected	Category 2 Normal	Category 3 Severe
Relay	Continuous Current	70 -- Resistive Load 70 -- Capacitive Load 50 -- Inductive Load 30 -- Motor 20 -- Filament (Lamp)	60 -- Resistive Load 60 -- Capacitive Load 40 -- Inductive Load 20 -- Motor 10 -- Filament (Lamp)	50 -- Resistive Load 50 -- Capacitive Load 30 -- Inductive Load 20 -- Motor 10 -- Filament (Lamp)
	Coil Energize Voltage	110, Maximum	110, Maximum	110, Maximum
	Coil Dropout Voltage	90, Minimum	90, Minimum	90, Minimum
	Ambient Temperature	10°C of Max Rated	20°C of Max Rated	30°C of Max Rated

5.5 Technology and design. The construction methods and materials of each type of relay differ. Considerable differences exist between the materials and processes used to manufacture relays. A relay, in its most basic form, is a combination of a switch and an inductive element. In solid state relays, the inductor is replaced by a semiconductor element. The following lists the major categories available:

a. Reed (or dry reed). A reed relay is operated by an electromagnetic coil or solenoid which, when energized, causes two flat magnetic strips to move laterally to each other. The magnetic reeds serve both as magnetic circuit paths and as contacts. Because of the critical spacing and the frailty of the arrangement, the reeds are usually sealed in a glass tube.

b. Electromagnetic. A electromagnetic relay's operation depends upon the electromagnetic effects of current flowing in an energizing winding.

c. Electromechanical. An electromagnetic relay is an electrical relay in which the designed response is developed by the relative movement of mechanical elements under the action of a current in the input circuits.

d. Solid state. A solid state relay incorporates semiconductor or passive circuit devices. As the name implies, it contains no moving parts, and therefore has low switching noise and essentially no bounce or chatter. Solid state relays also have long life and fast response times. Their main disadvantage is a limited number of applications for which they can be used. Solid state relays are typically not used in high temperature environments.

e. Latching (or magnetic latching). A bistable polarized relay having contacts that latch in either position. A signal of the correct polarity and magnitude will reset or transfer the contacts from one position to the other.

5.6 Shock-vibration. Special mounting considerations are necessary for mechanical relays in high temperature or vibration environments because relays are typically high mass parts and can switch unintentionally when subjected to shock. Particular care is needed in airborne applications. Relays should not unintentionally switch even during absolute worse case operating conditions. In addition, the designer should take into account the wear of springs in long life applications.

5.7 Arc suppression. Arc suppression techniques should be used to protect relay contacts of intermediate and power level devices to increase long term reliability. Arc suppression usually consists of external circuitry (e.g., diodes) to limit current surge.

5.8 Parallel redundancy. To increase reliability, relays can be designed into circuits with parallel redundancy. The relative probably of a relay failing in the open position is substantially higher than failure in a closed position (see Table 57-II), thereby improving reliability in parallel redundant configurations. However, parallel redundancy should only be used to increase reliability, not to increase the current handling capabilities of a relay circuit.