Properties of Relay Contact System

Edvard

Properties of Relay Contact System

Electrical contact

The word *"**contact**"* not only describes the conductive connection ot two mechanically separate electrical conductors, but also the conductive parts (contacts) even if they are not touching.

Contacts comprise:

- Non switching contacts as in connectors being opened only for service or installation (e.g. screw connections)
- Sliding contacts
- Plug contacts to carry but not to switch current
- Switching contacts as in relays, contactors and switchgear

Relay contacts are physically separate but switchable electric conductors designed to make an electrical connection, carry the load current, break the circuit and electrically isolate the load from the supply. How well the contact system actually performs is dependant on the suitability of the contact material, the contact arrangement and the mechanical design.

An ***ideal relay contact*** would consist of highly conductive metal with chemically clean surfaces (no oxidation) and a large, wear resistant, effective contact area. Open contacts would ideally have infinite dielectric strength for electrical isolation.

Unfortunately, actual relay contacts ***do not have*** these characteristics. An optimal contact material with high conductivity, resistance to oxidation or chemical reactions and resistance against wear and thermal influences during switching can only be a compromise. Design and cost clearly limits parameters such as the size of contact area, contact forces, relay sensitivity, and the need for big contact gaps for high dielectric strength.

Typical and most basic influences on electrical contacts and their respective effects are shown in the ***following tables***.

Influence On Electrical Contacts

Influences	Parameters	Effect
Electrical	• Current • Voltage	Heating, melting, material migration, chemical reactions, frilling, electrical discharge, contact resistance
Thermal	• Arc	Melting of contact material, material migration
Mechanical	• Friction • Pressure	Deformation, wear, cold welding, contact resistance
Ambient conditions	• Dust • Gases	Increased wear, particles, formation of chemical layers and corrosion
Chemical	• Oxidation	Contact resistance, inorganic and organic layers, corrosion

Influence On Switching Contacts Depending On Load Range

Load range	Main influences	Contact material	Considerations
Dry circuit < 100mV, < 10mA low level switching <1V, <10mA	• Mechanical • Chemical	gold plated materials	Contact resistance, sealed relays, wipe movement, twin contacts, outgas free and wear resistant plastic material
Intermediate level <15V, <300mA	• Mechanical • Chemical • Electrical	• AgNi 0.15 • AgNi 10 • (AgSn02) • (AgCd0)	Sealed relays, trilling, material transfer, contact resistance, outgassing
Power contacts 10-400V, 300mA-30A	• Electrical • Chemical	• AgNi 0.15 • AgNi 10 • AgSnO2 • AgCd0	Electrical life, contact welding, electrical wear, high temperatures, isolation properties, corrosion for sealed relays

Resource: *Schrack Relays*

Source: http://electrical-engineering-portal.com/properties-of-relay-contact-system