SIEMENS
Ingenuity for life

Highest availability even in harsh environment

SIPROTEC Compact – Conformal Coating

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Description
The term "conformal coating" refers to the coating of electronic modules. This coating provides protection against extreme moisture, corrosive gases and aggressive dust, or combinations thereof. Furthermore, the coating layer also offers mechanical protection against inappropriate handling and external influences. Conformal coating extends the lifetime of your devices in case of harsh environment.

SIPROTEC devices already feature a high degree of availability and long lifetime, even without additional coating. This is demonstrated by more than 1.6 million devices in operation worldwide. During the phase of product design, highest priority is given to fulfilling the relevant product standards, and compliance is proven by type tests, e.g. damp heat cycle tests according to
IEC 60068-2-30, involving exposure to mixed gases, sulfur dioxide SO_2 or hydrogen sulfide H_2S.

The new coating feature provides an additional level of protection for SIPROTEC Compact devices used in extremely harsh environmental conditions, such as:

- H_2S gas, which is present in certain industrial environments and may impair SMD components already at concentrations of 10 ppm
- Constant exposure to silver sulfide, which can lead to so-called "silver whiskers" on the surface of SMD components
- These negative influences may be even aggravated by high air humidity

In extreme cases, these influences may cause short-circuits or circuit breaks on the board and lead to restricted device functionality or failure.


Qualified coating production line

Qualified production process

The conformal coating of SIPROTEC Compact device PCBs is carried out in an established, high quality process.

In this process, the PCBs undergo an automated coating with a coating roboter and afterwards a hardening of the coating.

Type testing of coated PCBs

SIPROTEC protection and automation devices are tested and approved by independent and accredited test laboratories.
In this process, the SIPROTEC device is subjected to several test complexes.

Higher lifetime

In the course of test complex A, for example, the device is first exposed to corrosive gases and afterwards to damp heat. In contrast to single tests with different specimen, this combined approach simulates maximum harsh environmental conditions.

Test complex A:
Corrosive and climatic tests

- Corrosive gas SO_2, acc. to IEC 60068-2-42
- Corrosive gas H_2S, acc. to IEC 60068-2-43
- Mixed corrosive gases, acc. to IEC 60068-2-60
- Damp heat, cyclic, acc. to IEC 60068-2-30 and RL-guideline $ 14

Test complex B:
Climatic and mechanical-dynamic tests

- Temperature: +55 °C continuous, +70 °C for 96 h
- Fast temperature change cycles -40 °C <-> +85 °C acc. to IEC 60068-2-14
- Vibration and shock stress, acc. to IEC 60068-2-6, 60255-21-1
- Damp heat, cyclic, acc. to IEC 60068-2-30

Test complex C:
Hygroscopic dust

- Dust and sand, Arizona test dust, duration 24 h, acc. to IEC 60068-2-68, acc. to ANSI/ISA 71.04, class SD
- Damp heat, cyclic, acc. to IEC 60068-2-30

Test complex D: Salt mist test

- Additional specific tests to simulate “Offshore” conditions
- Salt mist IEC 60068-2-52, test Kb with increased parameters acc. Lloyd’s Register Specification

SIPROTEC Compact devices with conformal coating

- SIPROTEC 7SJ80
- SIPROTEC 7SJ81
- SIPROTEC 7SK80
- SIPROTEC 7SK81
- SIPROTEC 7SD80
- SIPROTEC 7RW80

Advantages

- Highest lifetime and high availability of SIPROTEC devices even under extreme environmental conditions
- Increased protection against harmful environmental influences such as corrosive gases and salts
- Additional mechanical protection against dust, abrasion and insects
- Reliable prevention of the formation of "dendrites" between components
- Increased protection of the PCBs against moisture
- Highest coating quality by means of a qualified production process

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