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PUBLICLY AVAILABLE SPECIFICATION

PRE-STANDARD

Withdrawn

Reed contact units –
Part 2-1: Heavy-duty reed switches – Quality assessment specification

IEC/PAS 62246-2-1:2008(E)

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IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: www.iec.ch

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REED CONTACT UNITS –

Part 2-1: Heavy-duty reed switches – Quality assessment specification

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A PAS is a technical specification not fulfilling the requirements for a standard, but made available to the public.

IEC/PAS 62246-2-1 has been processed by IEC Technical Committee 94: All-or-nothing electrical relays.

The text of this PAS is based on the following document:	This PAS was approved for publication by the P-members of the committee concerned as indicated in the following document
Draft PAS	**Report on voting**
94/264/NP	94/271/RVN

Following the publication of this PAS, which is a pre-standard publication, the technical committee or subcommittee concerned will transform it into an International Standard. It is intended to incorporate its contents into the next edition of IEC 62246-2 during the upcoming maintenance cycle for that standard.

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This PAS shall remain valid for an initial maximum period of 3 years starting from the publication date. The validity may be extended for a single 3-year period, following which it shall be revised to become another type of normative document, or shall be withdrawn.

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REED CONTACT UNITS –

Part 2-1: Heavy-duty reed switches – Quality assessment specification

1 Scope

This PAS defines requirements and tests for heavy-duty reed switches intended to be incorporated into devices that can be used in various industrial applications.

This PAS is to be used in conjunction with IEC 62246-2.

This PAS selects from IEC 62246-2 and from other sources the appropriate test procedures to be used in detail specifications derived from this PAS.

Two different product variants (variant A and variant B) are specified depending on characteristic values and tests (see Annex B).

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60068-2-11 (1981): *Environmental testing – Part 2: Tests. Test Ka: Salt mist*

IEC 60068-2-14 (1984): *Environmental testing – Part 2: Tests. Test N: Change of temperature*

IEC 60068-2-20 (1979): *Environmental testing. Part 2: Tests. Test T: Soldering*
Amendment 2 (1987)

IEC 60068-2-21 (2006): *Environmental testing – Part 2-21: Tests – Test U: Robustness of terminations and integral mounting devices*

IEC 60068-2-29 (1987): *Environmental testing. Part 2: Tests. Test Eb and guidance: Bump*

IEC 60068-2-78 (2001): *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

IEC 60127-2 (2003): *Miniature fuses – Part 2: Cartridge fuse-links*

IEC 61373 (1999): *Railway applications – Rolling stock equipment – Shock and vibration tests*

IEC 62246-1 (2002): *Reed contact units – Part 1: Generic specification*

IEC 62246-2 (2007): *Reed contact units – Part 2: Heavy-duty reed switches*

3 Test schedules

3.1 General

Test procedures are referenced in the corresponding subclauses of IEC 62246-2.

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3.2 Qualification approval procedures

Qualification approval procedures are indicated in Table 2 and Table 3:

- sampling and test schedule are specified in Table 2 and Table 3;
- the tests specified and their order is mandatory;
- tests stated in Table 2 are mandatory for the variants except when otherwise specified;
- tests stated in Table 3 are mandatory only for the variants indicated.

3.3 Quality conformance inspection

Quality conformance inspection contains the tests stated in Table 1:

- Group A: routine tests;
- Groups A and B: lot-by-lot tests;
- Group C: periodic tests.

Unless otherwise stated in this PAS, all tests of Table 1 are mandatory.

Where a subgroup contains cumulative tests, the order of the tests is mandatory. Specimens that have been subjected to tests denoted as destructive (D) shall not be released for delivery. Specimens that have been subjected to tests denoted as non-destructive (ND) are permitted to be released for delivery.

3.4 Formation of inspection lots

The basis for determination of sample size for the quality conformance inspection is the heavy-duty reed switch quantity produced during one month.

3.5 Intervals between tests

The following are the intervals necessary between tests:

- Subgroup A0: at shipment;
- Subgroups A4 and B1: at least once a month;
- Subgroup C1: at least once a year;
- Subgroup C4: at least once every two years.

3.6 Standard conditions for testing

If not otherwise stated, all tests shall be performed under standard conditions for testing according to 3.3 of IEC 62246-1.

3.7 Mounting of test specimens during the test

The following requirement shall apply for shock and vibration tests:

The heavy-duty reed switch shall be mounted by its normal mounting method to the test fixture, where inherent resonances have been minimized so as not to invalidate the test.

3.8 General conditions for testing

Unless otherwise stated, the test coil number and when applicable its polarity specified in Table 5 shall be used for all tests. Unless otherwise stated in this PAS, the polarity shall be as specified by the manufacturer.

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Table 1 – Quality conformance inspection

Group A
Subgroup A0

For all tests in this subgroup: 100 % test.

Test No.	Test	Test conditions according to IEC 62246-2	Performance requirements
A0 – 1	Visual inspection and check of dimensions (ND)	Subclause 3.4	According to Table 4 Marking as specified in 6.1
A0 – 2	Functional tests (ND)	Subclause 3.5, Procedure 1 Application points and standard test coil number: Must-operate value: Saturate value: 150 % of must-operate Must-release value: Contact failure-to-make and failure-to-break by monitoring a current, typically 10 mA at 24 V d.c.	According to Table 5 According to Table 4
A0 – 3	Contact-circuit resistance (ND)	Subclause 3.7 Application points: terminals of closed contacts Standard test coil number: Test coil voltage: 150 % of must-operate Test voltage max.: 6 V d.c. Test current max.: 1 A	Initial value according to Table 4 According to Table 5
A0 – 4	Dielectric test (ND)	Subclause 3.8 Application points and test voltage: Duration of test: 1 min A shorter test with a higher voltage may be stated in the detail specification	According to Table 4 Maximum leakage current: 0,5 mA
A0 – 5	Operate, release, transfer or bridging and bounce times (ND)	Subclause 3.10 Application points and standard test coil number: Test coil voltage: 150 % of must-operate 1) operate time 2) release time 3) operate bounce time Contact failure-to-make and failure-to-break by monitoring a current, typically 10 mA at 24 V d.c.	According to Table 5 According to Table 4
A0 – 6	Sealing (ND)	Subclause 3.22 Application points and standard test coil number: Arc time during test: Test coil voltage: 150 % of must-operate Test voltage: 100 V – 110 V d.c. Test current: 0,5 A – 0,55 A Total number of operations required: 3	According to Table 5 According to Table 7

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Table 1 – Quality conformance inspection (*continued*)

Subgroup A4 (period: inspection lot refers to the production volume in one month)

Test No.	Test	Test conditions according to IEC 62246-2	IL	AQL	Performance requirements
1	Visual inspection and check of dimensions (ND)	Subclause 3.4			According to Table 4 Marking as specified in 6.1
2	Functional tests (ND)	Subclause 3.5, Procedure 1 Application points and standard test coil number: Must-operate value: Saturate value: 150 % of must-operate Must-release value: Contact failure-to-make and failure-to-break by monitoring a current, typically 10 mA at 24 V d.c.			According to Table 5 According to Table 4
3	Contact-circuit resistance (ND)	Subclause 3.7 Application points: terminals of closed contacts Standard test coil number: Test coil voltage: 150 % of must-operate Test voltage max.: 6 V d.c. Test current max.: 1 A			Initial value according to Table 4 According to Table 5
4	Dielectric test (ND)	Subclause 3.8 Application points and test voltage: Duration of test: 1 min A shorter test with a higher voltage may be stated in the detail specification	S4	1,0	According to Table 4 Maximum leakage current: 0,5 mA
5	Operate, release, transfer or bridging and bounce times (ND)	Subclause 3.10 Application points and standard test coil number: Test coil voltage: 150 % of must-operate 1) operate time: 2) release time: 3) operate bounce time: Contact failure-to-make and failure-to-break by monitoring a current, typically 10 mA at 24 V d.c.			According to Table 5 According to Table 4
6	Sealing (ND)	Subclause 3.22 Application points and standard test coil number: Arc time during test: Test coil voltage: 150 % of must-operate Test voltage: 100 V – 110 V d.c. Test current: 0,5 A – 0,55 A Total number of operations required: 3			According to Table 5 According to Table 7

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Table 1 – Quality conformance inspection (*continued*)

Subgroup B1 (period: inspection lot refers to the production volume of one month)

Test No.	Test	Test conditions according to IEC 62246-2	IL	AQL	Performance requirements
7	Contact reliability test (D)	Subclause 3.32	S3	2,5	
		Test switch type and standard test coil number:			According to Table 5
		Test coil voltage: 150 % of must-operate			
		Coil suppression: N/A Duty cycle: 50 %			
		Switching load conditions:			According to Table 6
		Monitoring conditions:			According to Table 6 At each cycle during the test
		Final measurements:			
		Test 3 – contact-circuit resistance			According to Table 4
		Test 2 – functional tests			According to Table 4

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Table 1 – Quality conformance inspection *(continued)*

Subgroup C1 (period: one year)

Test No.	Test	Test conditions according to IEC 62246-2	Sample size	Acceptable number of failures	Performance requirements
8	Robustness of terminals (D)	Subclause 3.12 (in accordance with IEC 60068-2-21) Procedure: test Ua1 – tensile Final measurements: Test 1 – visual inspection Test 2 – functional tests Test 6 – sealing	6	0	According to Table 4 No breaking or loosening of terminals No cracks or other deterioration According to Table 4 According to Table 7
9	Soldering (D)	Subclause 3.13 (in accordance with IEC 60068-2-20, test Ta, method 1) Temperature: (235 ± 5) °C Duration: (2 ± 0,5) s Application point: 5 mm from the glass-to-metal seals Subclause 3.13 (in accordance with IEC 60068-2-20, test Ta, method 2) Temperature: (350 ± 5) °C Duration: (3 ± 0,5) s Application point: 5 mm from the glass-to-metal seals Final measurements: Test 1 – visual test Test 2 – functional tests Test 6 – sealing	5	0	The dipped surface shall be 95 % covered with new solder coating, the remaining 5 % may contain only small pinholes No cracks or other deterioration According to Table 4 According to Table 7

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Table 1 – Quality conformance inspection (*continued*)

Subgroup C1 (period: one year)

Test No.	Test	Test conditions according to IEC 62246-2	Sample size	Acceptable number of failures	Performance requirements
10	Rapid change of temperature (D)	Subclause 3.16 (in accordance with IEC 60068-2-14) Low temperature: – 50 °C High temperature: 100 °C Exposure time: 20 min Transition time: 1 min Number of cycles: 10 Final measurements: Test 4 – dielectric test Test 2 – functional tests Test 3 – contact-circuit resistance Test 1 – visual inspection Test 6 – sealing test	6	0	 According to Table 4 According to Table 4 According to Table 4 No cracks or other deterioration According to Table 7
11	Vibration (D) Functional	Subclause 3.19 Test switch type and standard test coil number: according to Table 5 Test coil voltage: 150 % of must-operate Axis of mounting: Vibration conditions: Application: three directions Number of sweeps per direction: 3 Sweep rate: 1 octave/min ± 10 % Total duration: approx. 3 × 10 min Test contact voltage and current: 24 V d.c. max., 10 mA max. Final measurements: Test 1 – visual inspection Test 2 – functional tests Test 6 – sealing	6	0	No opening of closed contact circuit with energization condition or closing of opened contact circuit shall exceed 10 µs The movable contact shall be located in the transverse direction According to Table 7 No cracks or other deterioration According to Table 4 According to Table 7

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Table 1 – Quality conformance inspection (*continued*)

Subgroup C1 (period: one year)

Test No.	Test	Test conditions according to IEC 62246-2	Sample size	Acceptable number of failures	Performance requirements
12	Electrical endurance (D)	Subclause 3.23	6	0	
		Test switch type and standard test coil number: Test coil voltage: 150 % of must-operate Coil suppression: N/A Duty cycle: 50 %			According to Table 5
		Switching load conditions:			According to Table 6
		Monitoring conditions:			According to Table 6 At each cycle during the test
		Final measurements:			
		Test 3 – contact-circuit resistance			According to Table 4
		If applicable: Test 2 – functional tests			According to Table 4
		Test 4 – dielectric test			According to Table 4

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