# SLOVENSKI STANDARD
# SIST EN 119000:2001

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**Generic Specification: Dry and mercury wetted reed contact units**

Generic Specification: Dry and mercury wetted reed contact units

Fachgrundspezifikation: Trockene und quecksilberbenetzte Reedkontakt-Einheiten

Spécification générique: Contacts secs et mouillés au mercure, en enceinte scellée



**Ta slovenski standard je istoveten z:** **EN 119000:1996**

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## Generic Specification: Dry and mercury wetted reed contact units

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Contacts secs et mouillés au mercure, en enceinte scellée

Fachgrundspezifikation:
Trockene und quecksilberbenetzte Reedkontakt-Einheiten



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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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## Foreword

This European Standard was prepared by the Technical Committee CENELEC TC/CECC SC 94, Relays.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 119000 on 1995-07-04.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1996-10-01

- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1996-10-01

The purpose of this specification was to establish a Generic Specification for several types of reed contact units previously covered by separate Generic Specifications, as already envisaged by the former WG 19 "Reed contact devices" (working group dissolved), see foreword to CECC 52 000 Issue 1.

Consequently, the documents listed below are replaced by this Generic Specification:

- CECC 17 000:1983, Issue 1 Generic Specification: Mercury wetted make contact units
- CECC 18 000:1983, Issue 1 Generic Specification: Dry reed change-over contact units, mechanically biased
- CECC 19 000:1978, Issue 1 Generic Specification: Dry reed make contact units
- CECC 51 000:1985, Issue 1 Generic Specification: Mercury wetted change-over contact units, magnetically biased
- CECC 52 000:1986, Issue 1 Generic Specification: Mercury wetted change-over contact units, mechanically biased

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# 1 General

## 1.1 Scope

This Generic Specification applies to dry and mercury wetted reed contact units of assessed quality. It lists the tests and measurement procedures which may be selected for use in Detail Specifications for such units. This document also specifies the quality assessment procedures to be followed.

This specification applies to those reed contact units which are operated by an applied magnetic field; it is not restricted to any particular type of contact load.

NOTE: Since tests using a standard coil and standard resistive loads are the easiest to specify and to define, this specification is currently restricted to tests of this type.

## 1.2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

| | | |
|---|---|---|
| CCITT K.17 | 1988 | Blue book, Volume IX: Protection from external interference |
| CECC 00 109 | 1974 | Rule of Procedure 9: Certified test records |
| CECC 00 114 | 1992 | Part II: Qualification approval of electronic components |
| IEC 27-1 | 1992 | Letter symbols to be used in electrical terminology- General |
| IEC 50 | | International Electrotechnical Vocabulary (IEV) |
| IEC 68-1<br>+ A1 | 1988<br>1992 | Basic environmental testing procedures. Part 1: General and guidance<br>(harmonized as EN 60068-1:1994) |
| IEC 68-2-1 | 1990 | Part 2: Tests - Tests A: Cold (harmonized as EN 60068-2-1:1993) |
| IEC 68-2-2<br>+ IEC 68-2-2A | 1974<br>1976 | Tests B: Dry heat<br>Supplement (harmonized as EN 60068-2-2:1993) |
| IEC 68-2-3<br>+ A1 | 1969<br>1984 | Test Ca: Damp heat, steady state<br>(harmonized as HD 323.2.3 S2:1987) |
| IEC 68-2-6 | 1995 | Test Fc: Vibration (sinusoidal) (harmonized as EN 60068-2-6:1995) |
| IEC 68-2-7<br>+ A1 | 1983<br>1986 | Test Ga: Acceleration, steady state<br>(harmonized as EN 60068-2-7:1993) |
| IEC 68-2-11 | 1981 | Test Ka: Salt mist (harmonized as HD 323.2.11 S1:1988) |
| IEC 68-2-13 | 1983 | Test M: Low air pressure (harmonized as HD 323.2.13 S1:1987) |
| IEC 68-2-14<br>+ A1 | 1984<br>1986 | Test N: Change of temperature<br>(harmonized as HD 323.2.14 S2:1987) |
| IEC 68-2-17 | 1994 | Test Q: Sealing (harmonized as EN 60068-2-17:1994) |

| | | |
|---|---|---|
| IEC 68-2-20<br>+ A1<br>+ A2 | 1979<br>1986<br>1987 | Test T: Soldering<br><br>(harmonized as HD 323.2.20 S3:1988) |
| IEC 68-2-21<br>A2<br>A3 | 1983<br>1991<br>1992 | Test U: Robustness of terminations and integral mounting devices<br>(harmonized as HD 323.2.21 S3:1988) |
| IEC 68-2-27 | 1987 | Test Ea: Shock (harmonized as EN 60068-2-27:1993) |
| IEC 68-2-29 | 1987 | Test Eb: Bump (harmonized as HD EN 60068-2-29:1993) |
| IEC 68-2-30<br>+ A1 | 1980<br>1985 | Test Db: Damp heat, cyclic<br>(harmonized as HD 323.2.30 S3:1988) |
| IEC 96 | series | Radio-frequency cables |
| IEC 317-1 | 1990 | Specifications for particular types of winding wires -- Part 1: Polyvinyl acetal enamelled round copper wire, class 105 (harmonized as EN 60317-1:1994) |
| IEC 410 | 1973 | Sampling plans and procedures for inspection by attributes |
| IEC 617 | series | Graphical symbols for diagrams |
| ISO 1000 | 1973 | SI units and recommendation for the use of their multiples and of certain other units |



### 1.3 Units, symbols and terminology



Units, graphical symbols, letter symbols and terminology shall, whenever possible, be taken from the following documents:

| | |
|---|---|
| ISO 1000 | SI units and recommendations for the use of their multiples and of certain other units |
| IEC 27 | Letter symbols to be used in electrical technology |
| IEC 50 | International electrotechnical vocabulary |
| IEC 617 | Graphical symbols for diagrams |

Any other units, symbols and terminology peculiar to one of the components covered by the Generic Specification, shall be taken from the relevant IEC or ISO documents, listed under 1.2, Normative references.

The following paragraphs contain additional terminology applicable to reed contact units.

#### 1.3.1 **reed contact unit**

Assembly containing contact blades, some or all of magnetic material, hermetically sealed in an envelope and controlled by means of externally generated magnetic field (e.g. an energizing quantity applied to a coil).

#### 1.3.2 **mercury wetted contact unit**

Assembly containing contact blades, some or all of magnetic material, some or all mercury wetted, hermetically sealed in an envelope and controlled by means of externally generated magnetic field (e.g. an energizing quantity applied to a coil).

1.3.3 **contact blade**

Metal blade providing either the functions of electric or magnetic circuit or both functions combined as in the case of dry and wetted reed contacts units.

For mercury wetted contact units: Metal blade providing either the functions of electric circuit through mercury or the magnetic circuit, or both functions combined.

1.3.4 **biasing magnetic field**

Continuous magnetic field intended to determine the operate and the release position of the contact, which can be adjusted to form a monostable or bistable contact unit.

NOTE: For bistable contact units, operate and release conditions have to be defined by the manufacturer in the Detail Specification with reference to applied magnetic field polarity.

1.3.5 **applied magnetic field**

Externally generated field (for example by a test coil) intended to change the position of the contact.

1.3.6 **contact unit, mechanically biased**

A contact unit where the biasing, to determine the operate and release positions, is achieved mechanically.



1.3.7 **magnetically biased contact unit**



Contact unit to which a biasing magnetic field is applied, determining the functional characterstics and the operate and release position.



1.3.8 **make contact** (Form A contact)

A make contact of a reed contact unit is open when there is no applied magnetic field. This is a normally open contact.

1.3.9 **break contact** (Form B contact)

A break contact of a reed contact unit is closed when there is no applied magnetic field. This is a normally closed contact.

1.3.10 **change-over reed contact unit**

A change-over reed contact unit contains a make contact and a break contact within its envelope, one contact blade being common.

(1) **change-over break-before-make reed contact unit** (Form C contact)

Change-over reed contact unit, one contact circuit of which breaks before the other makes.

(2) **change-over make-before-break reed contact unit** (Form D contact)

Change-over reed contact unit, one contact circuit of which makes before the other breaks.

(3) **change-over reed contact unit with unspecified switching sequence** (Form A + B contact)

Change-over reed contact unit where the switching sequence can be either make-before-break or break-before-make.

1.3.11 **type**

A type comprises products having similar design features manufactured by the same techniques and falling within the manufacturer's usual range of ratings for these products

NOTE: Mounting accessories are ignored, provided they have no significant effect on the test results.

1.3.12 **variant**

A variation within a type having specific nominal dimensions and characteristics.

1.3.13 **rated value**

The value assigned by the manufacturer to a given characteristic of the reed contact unit.

1.3.14 **operate position**

Position where the make contact is closed and the break contact is open.

1.3.15 **release position**

Position where the make contact is open and the break contact is closed.

1.3.16 **to operate**



A reed contact unit operates when it changes from the release position to the operate position.



1.3.17 **to release**



A reed contact unit releases when it changes from the operate position to the release position.



1.3.18 **just-operate value**

The value of the magnetic field at which the released reed contact unit just operates (see figure 1).

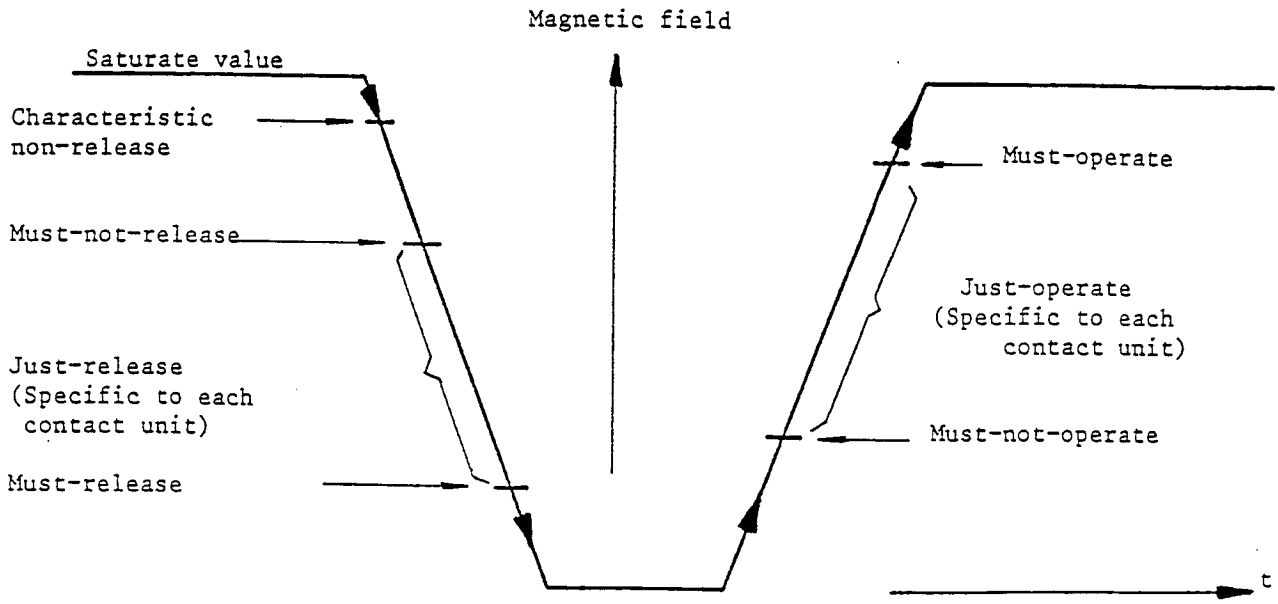



**Figure 1: Functional characteristics**

1.3.19 **must-operate value**

The stated limit of the applied magnetic field at which the reed contact unit operates (see figure 1).

1.3.20 **just-release value**

The value of the applied magnetic field at which the operated reed contact unit just releases (see figure 1).

1.3.21 **must-release value**

The stated limit of the applied magnetic field at which the operated reed contact unit releases (see figure 1).

1.3.22 **must-not-operate value**

The stated limit of the applied magnetic field at which the reed contact unit does not operate (see figure 1).

1.3.23 **must-not-release value**

The stated limit of the applied magnetic field at which the operated reed contact unit remains operated (see figure 1).

1.3.24 **characteristic non-release value**

The stated value of the applied magnetic field above which the operated reed contact unit fulfils specified qualities, e.g. contact resistance, noise characteristics etc. (see figure 1).



1.3.25 **saturate value**

The arbitrarily defined value of the applied magnetic field at which the reed contact unit is unaffected by further increase of the applied magnetic field (see figure 1).



1.3.26 **bounce**

A momentary re-opening of a contact after initial closing, or a momentary closing after initial opening.

1.3.27 **magnetic dwell** (only for change-over contact units)

Difference in the values of applied magnetic field when the break contact just opens and the make contact just closes, or vice versa.

NOTE: For time definitions see figure 2, for test conditions see 3.10.

1.3.28 **bounce time**

The interval of time between the instant of the first closing (or opening) and the instant of the final closing (or opening) of the reed contact unit.

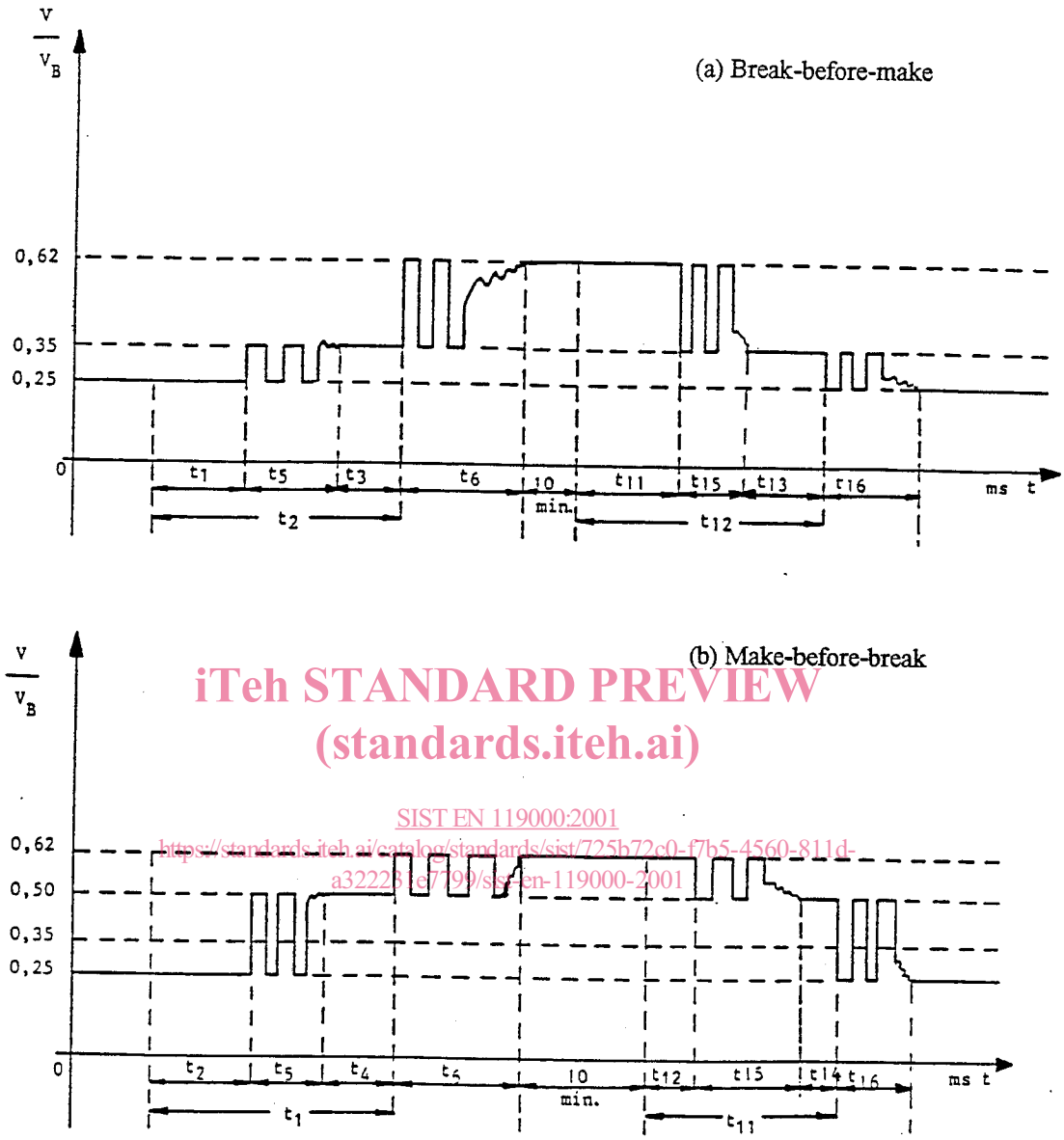
1.3.29 **operate time**

The time between the instant of the application of a magnetic field to a reed contact unit and the instant the contact is in the operate position. The operate time does not include bounce time.

1.3.30 **release time**

The time between the instant of the removal of the applied magnetic field to a reed contact unit, and the instant the contact is in the release position. The release time does not include bounce time.

**Oscilloscope diagram**






| Energization of the test coil | De-energization of the test coil |
|---|---|
| $t_1$: operate break time | $t_{11}$: release break time |
| $t_2$: operate make time | $t_{12}$: release make time |
| $t_3$: operate transfer time | $t_{13}$: release transfer time |
| $t_4$: operate bridging time | $t_{14}$: release bridging time |
| $t_5$ and $t_6$: bounce times | $t_{15}$ and $t_{16}$: bounce times |

**Figure 2: Time definitions**

1.3.31 **transfer time** (Form C)

The time interval during which both contact circuits are open (not including bounce time).

1.3.32 **bridging time** (Form D)

The time interval during which both contact circuits are closed (not including bounce time).

1.3.33 **operate make time**

The time interval between the instant of the application of a magnetic field to the contact unit and the instant of the first closing of the make contact.

1.3.34 **operate break time**

The time interval between the instant of the application of a magnetic field to the contact unit and the instant of the first opening of the break contact.

1.3.35 **release make time**

The time interval between the instant of the removal of an applied magnetic field from the reed contact unit and the instant of the first closing of the break contact.

1.3.36 **release break time**



The time interval between the instant of the removal of an applied magnetic field from the reed contact unit and the instant of the first opening of the make contact.

1.3.37 **operate transfer time** (Form C)



The transfer time measured when the break-before-make reed contact unit moves from the release position to the operate position.

1.3.38 **release transfer time** (Form C)

The transfer time measured when the break-before-make reed contact unit moves from the operate position to the release position.

1.3.39 **operate bridging time** (Form D)

The bridging time during which the make-before-break reed contact unit moves from the release to the operate position.

1.3.40 **release bridging time** (Form D)

The bridging time during which the make-before-break reed contact unit moves from the operate to the release position.

1.3.41 **minimum time of operate energization**

The minimum time between the instant of the first application of a magnetic field (at a stated value), and the instant of reduction of that field to the characteristic non release value to ensure that the reed contact unit is maintained in the operate condition.

1.3.42 **time to stable closed position**

The time between the instant of application of a specified magnetic field to the instant at which the reed contact unit fulfils specified qualities, e.g. contact resistance, noise characteristics, etc.

1.3.43 **maximum cycling frequency**

The maximum number of cycles per second, at and below which, the contact unit still meets the specifications.

1.3.44 **failure-to-make**

A fault condition of the contacts, indicated by the contact circuit resistance of the unit exceeding a specified value, for a specified applied magnetic field, within a specified period.

1.3.45 **failure-to-break**

A fault condition of the contacts, indicated by the contact circuit resistance of the unit failing to exceed a specified value, for a specified applied magnetic field, within a specified period.

1.3.46 **contact sticking**

Failure-to-break of a reed contact unit due to residual magnetic, physical or chemical effects.

1.3.47 **maximum contact current**



The maximum allowed switched d.c. or peak current in correlation to a given number and frequency of operations and load, under specified conditions.



1.3.48 **limiting continuous current**

The highest value of the current (r.m.s. if a.c.) which a previously closed contact is capable of carrying continuously, in specified conditions.

1.3.49 **maximum contact voltage**

The maximum allowed switched d.c. or peak voltage, in correlation to a given number of operations and load, under specified conditions.

1.3.50 **contact noise**

The spurious peak-to-peak voltage which is generated across the reed contact unit terminations, in specified conditions.

1.3.51 **thermal e.m.f.**

An e.m.f. generated by the reed contact unit, when connected to an external circuit in an operate position and subjected to a temperature differential.

1.3.52 **duty cycle**

The ratio, expressed as a percentage, of the duration of energization to the interval between commencements of successive energizations.

1.3.53 **drain - time**

Time taken for the contacts to become electrically open after they have been flooded with mercury by inversion and then returned to the preferred position.

In case of change-over mercury wetted contact units there are two drain-times; one for each position of the contact.

1.3.54 **preferred position**

The position recommended for use and in which tests are normally performed, unless otherwise specified.

1.3.55 **mounting position restriction**

Maximum angle from the preferred position at which the device may be mounted and still meets the specifications.

## 1.4 Preferred values

The following preferred values shall be used, unless otherwise stated in the Detail Specification.

1.4.1 **Frequency of operation**

1, 2, 5, 8, 10, 12,5, 16, 20, 25, 30, 50, 60, 100, 500 operations per second.



1.4.2 **Duty cycle**

50 %.



1.4.3 **Open circuit voltage across contacts**

(1) 0,01; 0,1; 5, 12, 24, 50, 110, 127, 150, 220, 250, 380, 500, 1000, 1500, 2000 V a.c. (r.m.s.)

(2) 0,01; 0,03; 0,05; 0,1, 1, 1,5; 4,5; 5, 6, 6,3; 10, 12, 15, 17, 20, 24, 30, 36, 48, 50, 60, 80, 100, 110, 150, 175, 200, 250, 440, 500, 600, 800, 1200, 1500 V d.c.

1.4.4 **Current rating**

1, 1,25; 1,6; 2, 2,5; 3,15; 4, 5, 6,3; 8 A or the decimal multiples or submultiples of these figures in A; 1, 2 and 5 are preferred.

1.4.5 **Load ratings**

1, 2, 5, 10, 15, 30, 50, 100, 150, 250, 500 VA

1.4.6 **Number of operations**

5 000, 10 000, 20 000, 50 000

$1 \cdot 10^5$, $2 \cdot 10^5$, $1 \cdot 10^6$, $2 \cdot 10^6$, $5 \cdot 10^6$, $1 \cdot 10^7$, $2 \cdot 10^7$, $5 \cdot 10^7$, $1 \cdot 10^8$, $2 \cdot 10^8$, $5 \cdot 10^8$, $1 \cdot 10^9$, $1 \cdot 10^{10}$.

### 1.4.7 Climatic category

The climatic category (see appendix A of IEC 68-1) of a reed contact unit, both steady state and cyclic, shall be established by a selection from the following preferred standard values of lower and upper ambient temperatures and damp heat values.

(1) The preferred values of lower ambient temperature are:

- 65, - 40, - 25, -10 °C

(2) The preferred values of upper ambient temperature are:

40, 55, 70, 85, 100, 125, 200 °C

(3) The preferred times of exposure to damp heat, steady state are:

4, 10, 21, 56 days

(4) The preferred climatic categories are:

65 / 125 / 56
40 / 100 / 56
40 / 100 / 21
40 / 085 / 56
40 / 070 / 21
25 / 070 / 21
25 / 055 / 04
10 / 040 / 04
10 / 055 / 04



### 1.4.8 Preferred environmental severities

(1) Vibration (IEC 68-2-6, Test Fc)

| Frequency | Vibration amplitude or acceleration | No. of sweep cycles |
|---|---|---|
| 10-500 Hz | 0,35 mm or 49 m/s² (5 g) | 10 |
| 10-500 Hz | 0,75 mm or 98 m/s² (10 g) | 10 |
| 10-2000 Hz | 0,75 mm or 98 m/s² (10 g) | 8 |
| 10-2000 Hz | 1,5 mm or 196 m/s² (20 g) | 8 |

Duration of the sweep endurance in each of the 3 axes is given by a specified number of sweep cycles. Sweep rate: 1 octave per minute ± 10%.
Cross-over frequency between 57 and 62 Hz.

(2) Bump (IEC 68-2-29, Test Eb): 1 000 ± 10 bumps at 390 m/s², duration 6 ms.

(3) Shock (IEC 68-2-27, Test Ea)

11 ms, 490 m/s², 50 g
11 ms, 294 m/s², 30 g