INTERNATIONAL STANDARD

ISO 18185-3

Second edition
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Freight containers — Electronic seals —

Part 3: Environmental characteristics

Récipients de fret — Joints électroniques —

Partie 3: Caractéristiques environnementales

Reference number
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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 104, *Freight containers*, Subcommittee SC 4, *Identification and communication*.

This second edition cancels and replaces the first edition (ISO 18185-3:2006), which has been technically revised.

ISO 18185 consists of the following parts, under the general title *Freight containers — Electronic seals*:

— *Par 1: Communication protocol*

— *Part 2: Application requirements*

— *Part 3: Environmental characteristics*

— *Part 4: Data protection*

— *Part 5: Physical layer*

Introduction

This part of ISO 18185 defines the environmental characteristics for compliant electronic seals.

Freight containers — Electronic seals —

Part 3:
Environmental characteristics

1 Scope

This part of ISO 18185 specifies test methods and conditions for environmental characteristics of electronic seals.

This part of ISO 18185 describes the environmental requirements for the ISO 18185 series, for ISO 10374 and for ISO 17363 and for ISO 10891 since it is expected that the implementation of these International Standards will face the same international conditions. However, each of these International Standards has its own unique requirements other than environmental conditions.

2 Normative references

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

ISO 17712, *Freight containers — Mechanical seals*

IEC 61000-4-2, *Electromagnetic compatibility (EMC) — Part 4-2: Testing and measurement techniques — Electrostatic discharge immunity test*

IEC 61000-4-3, *Electromagnetic compatibility (EMC) — Part 4-3: Testing and measurement techniques — Radiated, radio-frequency, electromagnetic field immunity test*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
electronic seal
e-seal
read-only, non-reusable freight container seal conforming to the high-security seal defined in ISO 17712 and to this International Standard that electronically provides evidence of tampering or intrusion through the container doors

3.2
equipment under testing
EUT
any type of device that will undergo the tests described in this part of ISO 18185

3.3
interrogator identification
interrogator ID
code used to identify the source address during every communication session originated by the interrogator

3.4
operation test
short functional test by a suitably qualified person to confirm that the *electronic seal* (3.1) complies with the operational requirements including a check of survives and maintains the integrity of stored data

3.5
seal identification
seal ID
unique code used to identify each manufactured seal incorporating a combination of the serial number (i.e. tag ID) and the manufacturer ID

4 Environmental characteristics

4.1 General

This part of ISO 18185 shall be used in conjunction with other parts of ISO 18185.

This part of ISO 18185 applies to all electronic seals used on freight containers covered by the following International Standards: ISO 668, ISO 1496-1, ISO 1496-2, ISO 1496-3, ISO 1496-4, ISO 1496-5, and ISO 830. This part of ISO 18185 should also, wherever appropriate and practicable, be applied to freight containers other than those covered by the aforementioned International Standards.

This part of ISO 18185 establishes minimum operating parameters for environmental characteristics and the test used to measure those characteristics.

This part of ISO 18185 is designed to test container seal resistance to electrical and mechanical deterioration due to exposure to the shipboard environment or to the rigors of mishandling such as dropping, where appropriate, or transportation and installation. Container seals are typically subjected to the harsh environments of the marine, rail, and road transportation industries. Sand and dust, salt spray, grease, snow, ice, and grime can be expected to coat the tag and sensing equipment. Physical shock and vibration are commonly encountered as a result of handling and transport operations.

Normal ambient conditions are defined as any combination of the following:

— temperature: (15 to 35) °C;

— relative humidity: (20 to 75) %;

— air pressure: (86 to 106) kPa.

4.2 Low temperature

4.2.1 Test purpose

The purpose of this test is to verify that no damage is caused to the EUT and no permanent or temporary malfunction occurs after being stored and during storage at cold temperatures for the low temperature testing.

4.2.2 Test requirement

EUT shall fully operate after having been stored at a minimum low temperature.

4.2.3 Test method for storage temperature testing

— Preconditioning: normal ambient conditions.

— The EUT shall be placed in the test chamber and the temperature cycle is started at normal ambient conditions. The EUT shall be kept at the test temperature for the test period (see Table 1).

Table 1 — Conditions of low storage temperature

Storage temperature	(−55 ± 2) °C
Duration	96 h (four days)

— The operation test shall be performed after bringing the EUT up to ambient temperature for 4 h prior to conducting the test.

4.2.4 Test method for operating temperature testing

— Preconditioning: normal ambient conditions

— The EUT (equipment under testing) shall be placed in the test chamber and the temperature cycle is started at normal ambient conditions. The EUT shall be kept at the test temperature for the period specified in Table 2.

Table 2 — Conditions of low operating temperature

Operating temperature	(−40 ± 2) °C
Duration	4 h

— The operation test shall be performed while conducting the test.

— Reference: IEC 60068-2-1, Test Ab and Ad (or MIL-STD-810G, Method 502.5), IEC 60721-3-2:1997, Table 1, Classes 2K4 and 2K5.

4.3 High temperature

4.3.1 Test purpose

The purpose of this test is to verify that no damage is caused to the EUT and no permanent or temporary malfunction occurs after being stored and during storage at hot temperatures for the high temperature testing.

4.3.2 Test requirement

EUT shall fully operate after having been stored at a maximum high temperature.

4.3.3 Test method for storage temperature testing

— Preconditioning: normal ambient conditions

— The EUT shall be placed in the test chamber and the temperature cycle is started at normal ambient conditions. The EUT shall be kept at the test temperature for the period specified in Table 3.

Table 3 — Conditions of high storage temperature

Storage temperature	(85 ± 2) °C
Duration	96 h (4 days)

— The operation test shall be performed after bringing the EUT up to ambient temperatures for 4 h prior to conducting the test.

4.3.4 Test method for operating temperature testing

— Preconditioning: normal ambient conditions.

— The EUT shall be placed in the test chamber and the temperature cycle is started at normal ambient conditions. The EUT shall be kept at the test temperature for the period specified in Table 4.

Table 4 — Conditions of high operating temperature

Operating temperature	(70 ± 2) °C
Duration	4 h

— The operation test shall be performed while conducting the test.

— Reference: IEC 60068-2-2, Test Bb and Bd (or MIL-STD-810G, Method 501.5), IEC 60721-3-2:1997, Table 1, Classes 2K4 and 2K5.

4.4 Mechanical shock

4.4.1 Test purpose

The purpose of this test is to verify that no damage is caused to the EUT and no permanent or temporary malfunctions occur under the influence of mechanical shocks.

4.4.2 Test requirement

EUT shall fully operate during and after having been subject to a mechanical shock.

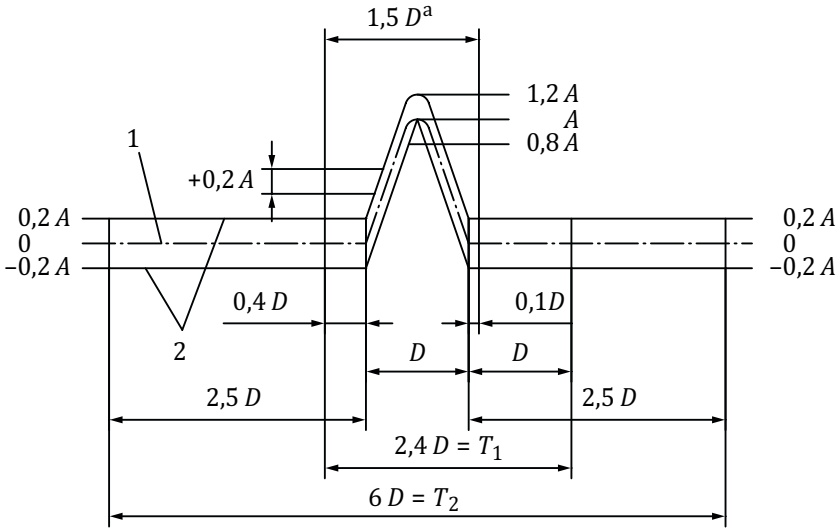
4.4.3 Test method

— Three successive shocks shall be applied in each direction of three mutually perpendicular axes of EUT for a total of 18 shocks.

Table 5 — Conditions of mechanical shocks

Peak acceleration	50 g[a] for 11 ms
Pulse shape (see Figure 1)	half-sine
The number of shock	18
Orientation	three mutually perpendicular axes

[a] 1g = 9,8 m/s^2 (equivalent 10 m/s^2).



Key

1 nominal pulse

2 limits of tolerance

D duration of nominal pulse

A peak acceleration of nominal pulse

T_1 minimum time during which the pulse shall be monitored for shocks produced using a conventional shock-testing machine

T_2 minimum time during which the pulse shall be monitored for shocks produced using a vibration generator

Figure 1 — Pulse shape and limits of tolerance for half-sine pulse

— The operation test shall be performed after completion of the mechanical shock test.

— Reference: IEC 60068-2-27, Test Ea (or MIL-STD-810G, Method 516.6).

4.5 Vibration

4.5.1 Test purpose

The purpose of this test is to verify that no damage is caused to the EUT and no permanent or temporary malfunctions occur under the influence of broadband random vibrations.

4.5.2 Test requirement

EUT shall fully operate after having been subject to a vibration testing.

4.5.3 Test method

— This test shall be performed in accordance with IEC 60068-2-6.