



SLOVENSKI STANDARD
SIST EN 15433-1:2008
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Transportation loads - Measurement and analysis of dynamic mechanical loads - Part 1:
General requirements

Transportbelastungen - Messen und Auswerten von mechanisch-dynamischen
Belastungen - Teil 1: Allgemeine Anforderungen

Charges de transport - Mesurage et analyse des charges mécaniques dynamiques -
Partie 1 : Exigences générales

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English Version

Transportation loads - Measurement and evaluation of dynamic mechanical loads - Part 1: General requirements

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Transportbelastungen - Messen und Auswerten von mechanisch-dynamischen Belastungen - Teil 1: Allgemeine Anforderungen

This European Standard was approved by CEN on 28 October 2007.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Page

Foreword	3
Introduction	4
1 Scope.....	5
2 Normative references	5
3 Requirements	5
3.1 Fundamental requirements	5
3.2 Location of measuring points.....	5
3.3 Source data.....	6
3.4 Care during data acquisition and documentation	6
3.5 Measuring report.....	6
3.6 Measurement on a transported item	6
3.7 Data validity check.....	6
3.8 Data analysis	6
3.9 Derivation of test specifications.....	7
3.10 Transportation monitoring with automatic recording equipment.....	7
Bibliography	8

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[SIST EN 15433-1:2008](https://standards.iteh.ai/catalog/standards/sist/7a88fce3-95c7-453c-8300-15e6f0b8f44d/sist-en-15433-1-2008)

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Foreword

This document (EN 15433-1:2007) has been prepared by Technical Committee CEN/TC 261 "Packaging", the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2008, and conflicting national standards shall be withdrawn at the latest by June 2008.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

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Introduction

This standard was originally prepared by working group NAVp-1.4, Requirements and Testing, of the German Standardisation Institute (DIN). It is part of a complete normative concept to acquire and describe the loads acting on goods and influencing them during transport, handling and storage.

This standard becomes significant when related to the realisation of the European Directive on Packaging and Packaging Waste (Directive 94/62 EC, 20 December 1994). This directive specifies requirements on the avoidance or reduction of packaging waste, and requires that the amount of packaging material is adjusted to the expected transportation load, in order to protect the transportation item adequately. However, this presumes some knowledge of the transportation loads occurring during shipment.

At present, basic standards, based on scientifically confirmed values, which can adequately describe and characterize the magnitudes of transportation loads, especially in the domain of dynamic-mechanical loads, do not exist nationally or internationally. Reasons for this are mainly the absence of published data, insufficient description of the measurements, or restrictions on the dissemination of this information.

This standard will enable the measurement and evaluation of dynamic mechanical transportation loads, thus enabling the achievement of standardized and adequately documented load values.

This series of standards consists of the following parts:

- Part 1: General requirements
- Part 2: Data acquisition and general requirements for measuring equipment
- Part 3: Data validity check and data editing for evaluation
- Part 4: Data evaluation
- Part 5: Derivation of test specifications
- Part 6: Automatic recording systems for measuring randomly occurring shock during monitoring of transports.

This standard describes the basics and principles to be applied when measuring and analysing transportation loads.

1 Scope

This standard specifies the general requirements to be observed during the measurement and evaluation of dynamic-mechanical transportation loads, should the results raise a claim of generalization and be incorporated in this series of standards as fundamental data.

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.

EN 15433-2, *Transportation loads — Measurement and evaluation of dynamic-mechanical loads — Part 2: Data acquisition and general requirements for measuring equipment*

EN 15433-3, *Transportation loads — Measurement and evaluation of dynamic-mechanical data — Part 3: Data validity check and data editing for evaluation*

EN 15433-4, *Transportation loads — Measurement and evaluation of dynamic-mechanical loads — Part 4: Data evaluation*

EN 15433-5, *Transportation loads — Measurement and evaluation of dynamic-mechanical loads — Part 5: Derivation of test specifications*

EN 15433-6, *Transportation loads — Measurement and evaluation of dynamic-mechanical loads — Part 6: Automatic recording systems for measuring randomly occurring shock during monitoring of transports*

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3 Requirements

3.1 Fundamental requirements

Transportation loads shall be measured on the transportation means, and independently of the items to be transported.

NOTE Transportation loads depend on technical equipment (e.g. transportation means, handling equipment and conveyers), handling (e.g. topple, throw-down operation and stowing), and environmental conditions (e.g. temperature, humidity, sunlight and air pollution), and can evoke stress on or inside the transported item, which can lead to damage. The type and intensity of the damage depend upon the nature of the goods (e.g. temperature and shock sensitivity) and their packing and therefore can as a rule, only be determined and assessed from isolated cases. To determine the transportation capability, more post-laboratory tests are performed, during which standardized transportation loads have to be simulated.

3.2 Location of measuring points

To achieve compatibility between different transportation means, the location of the measuring points shall be the interface between the transportation means and the transported item, i.e., as a rule, on the cargo platform. If it can be assured that the transmissibility between load input and location of the measuring points is adequately known and the influence of the package on the measured values is not taken into consideration, then instead of the cargo platform a different location of the measuring point (e.g. inside the package) can be chosen for specific transport and handling proceedings.

NOTE For the compatibility and generalisation of transportation loads, it is necessary that these are determined independently of the properties of the cargo, although a dynamic mechanical reaction of the specific transported item onto the oscillatory and shock behaviour cannot be excluded.

3.3 Source data

Dynamic mechanical loads appear as physical events and therefore shall be recorded as force-time or acceleration-time histories. These data are described as source data as long as they are recorded and stored, before any pre-processing or analysis (e.g. by spectral analysis).

NOTE Parties other than those that have performed the measurement should also be able to judge the confidence capability of the measurements and duplicate the analysis, if necessary with different methods. It is also advantageous to decouple the analyses from the measurements, because transportation for the purpose of measuring is more costly and difficult to repeat than arithmetical analyses.

3.4 Care during data acquisition and documentation

Since other users rely on the confidence capability of the data, the measurements require accurate planning and execution and shall be performed according to EN 15433-2 in order to generally describe the transportation loads for the purpose of introducing them into the standards. As transparency of the measurements to non-participating experts is necessary, extensive documentation of the measurements is required. Data shall be used in standards (e.g. standardized load profiles) only when it is assured that the utmost care has been applied to acquire and document the data.

NOTE Generally the determination of dynamic-mechanical loads is a demanding measurement task, which requires efficient measuring equipment and a correspondingly large amount of know-how from the test manager. Many interferences and error possibilities can falsify the measuring results and therefore lead to incorrect interpretations.

3.5 Measuring report

Measurements performed according to this standard shall make use of the measuring reports included in EN 15433-2. Situations other than the ones described in the measuring reports of EN 15433-2 shall be documented accordingly.

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3.6 Measurement on a transported item

Measurements on a transported item are only permissible in case of justifiable exceptions.

NOTE Measurements performed directly on a transported item only contain the dynamic behaviour of the measuring chain from the transportation means to the transported item, and therefore do not necessarily reflect the behaviour of the transportation means. The measurements can only be used for standardisation purposes when the transmission characteristic is known and has been described.

3.7 Data validity check

Measured values shall be checked according to EN 15433-3 for their validity, their capability to be generalized and their applicability.

NOTE When measuring and analysing dynamic processes, unnoticed or difficult-to-recognize disturbances or erroneous measurements often occur, which lead to misinterpretations. A data validity check should therefore be performed prior to any data analyses, whereby the measured values should be related to the corresponding physical events, and their plausibility should be ensured.

3.8 Data analysis

The analysis of the measured data shall be performed according to EN 15433-4.

3.9 Derivation of test specifications

From those measurements performed and analysed in EN 15433-2, EN 15433-3 and EN 15433-4, it is possible to derive corresponding test specifications. For this purpose, EN 15433-5 shall be applied.

3.10 Transportation monitoring with automatic recording equipment

Automatic recording equipment, which is usually mounted inside a packed item, shall be selected and applied according to EN 15433-6.

NOTE Due to its limited measuring range, recording equipment is not suitable for the continuous acquisition of acceleration-time signals over a lengthy period of time, and the recorded values therefore can only be used with exceptions for the derivation of test specifications according to EN 15433-5. Furthermore, the equipment is mainly used inside a package and not on the cargo platform. However, it is suitable for recording event-dependent shocks (shock recording), whereby a certain shock load is used as a trigger signal. This makes it possible to survey lengthy transportations in order to detect the shock loads that occur in certain phases of a transport chain. When accordingly documented and judged by a technical body, these measured shock values can be used for standardized load assumptions.

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