

# SVENSK STANDARD

## SS-EN ISO 10326-1:2016

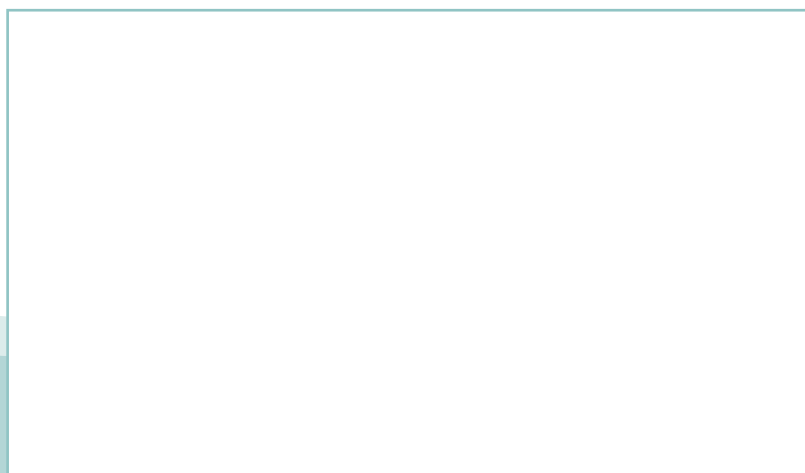


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### **Vibration och stöt – Laboratoriemetod för bestämning av vibration i fordonssitsar – Del 1: Grundläggande krav (ISO 10326-1:2016)**

### **Mechanical vibration – Laboratory method for evaluating vehicle seat vibration – Part 1: Basic requirements (ISO 10326-1:2016)**



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Europastandarden EN ISO 10326-1:2016 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN ISO 10326-1:2016.

Denna standard ersätter SS-EN 30326-1, utgåva 1; SS-EN 30326-1/A1:2007, utgåva 1 och SS-EN 30326-1/A2:2011, utgåva 1.

The European Standard EN ISO 10326-1:2016 has the status of a Swedish Standard. This document contains the official English version of EN ISO 10326-1:2016.

This standard supersedes the Swedish Standard SS-EN 30326-1, edition 1; SS-EN 30326-1/A1:2007, edition 1 and SS-EN 30326-1/A2:2011, edition 1.

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*Information about the content of the standard is available from the Swedish Standards Institute (SIS), telephone +46 8 555 520 00. Standards may be ordered from SIS Förlag AB, who can also provide general information about Swedish and foreign standards.*

Denna standard är framtagen av kommittén för Människans påverkan av vibrationer, SIS/TK 111/AG 1.

Har du synpunkter på innehållet i den här standarden, vill du delta i ett kommande revideringsarbete eller vara med och ta fram andra standarder inom området? Gå in på [www.sis.se](http://www.sis.se) - där hittar du mer information.



EUROPEAN STANDARD

EN ISO 10326-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2016

ICS 13.160; 43.020; 53.100; 65.060.10

Supersedes EN 30326-1:1994

English Version

## Mechanical vibration - Laboratory method for evaluating vehicle seat vibration - Part 1: Basic requirements (ISO 10326-1:2016)

Vibrations mécaniques - Méthode en laboratoire pour l'évaluation des vibrations du siège de véhicule - Partie 1: Exigences de base (ISO 10326-1:2016)

Mechanische Schwingungen - Laborverfahren zur Bewertung der Schwingungen von Fahrzeugsitzen - Teil 1: Grundlegende Anforderungen (ISO 10326-1:2016)

This European Standard was approved by CEN on 5 October 2016.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



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COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

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## European foreword

This document (EN ISO 10326-1:2016) has been prepared by Technical Committee ISO/TC 108 “Mechanical vibration, shock and condition monitoring” in collaboration with Technical Committee CEN/TC 231 “Mechanical vibration and shock” the secretariat of which is held by DIN.

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 May 2017, and conflicting national standards shall be withdrawn at the latest by May 2017.

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

This document supersedes EN 30326-1:1994.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive.

For relationship with EU Directive, see informative Annex ZA, which is an integral part of this document.

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, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

### Endorsement notice

The text of ISO 10326-1:2016 has been approved by CEN as EN ISO 10326-1:2016 without any modification.

## Introduction

Drivers, staff and passengers of vehicles (land, air or water) and mobile machinery are exposed to mechanical vibration which interferes with their comfort, working efficiency and, in some circumstances, safety and health. Such vehicles and mobile machines are often fitted with seats that are designed and made in accordance with current state-of-the-art with regard to their capacity to control or reduce transmitted whole-body vibration.

To assist in the development of such seats, specific test codes have been, or are being, produced to evaluate the performance of seats. The following basic requirements have therefore been developed to give guidance for the specification of laboratory testing of vibration transmission through a vehicle seat to the occupant and for the evaluation of the ability of a seat to control the shock arising from over-travel of the suspension.

The seat constitutes the last stage of suspension before the driver. To be efficient at attenuating the vibration, the suspension seat should be chosen according to the dynamic characteristics of the vehicle. Any performance criteria provided should be set in accordance with what is attainable using best design practice. Such criteria do not necessarily ensure the complete protection of the operator against risks associated with exposure to vibration and shock which are generally believed to be risk of spinal injury.



# Mechanical vibration — Laboratory method for evaluating vehicle seat vibration —

## Part 1: Basic requirements

### 1 Scope

This document specifies basic requirements for the laboratory testing of vibration transmission through a vehicle seat to the occupant. These methods for measurement and analysis make it possible to compare test results from different laboratories for equivalent seats.

It specifies the test method, the instrumentation requirements, the measuring assessment method and the way to report the test result.

This document applies to specific laboratory seat tests which evaluate vibration transmission to the occupants of any type of seat used in vehicles and mobile off-road machinery.

Application standards for specific vehicles refer to this document when defining the test input vibration that is typical for the vibration characteristics of the type or class of vehicle or machinery in which the seat is to be fitted.

NOTE Examples of application standards are given in the bibliography.

### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 2631-1, *Mechanical vibration and shock — Evaluation of human exposure to whole-body vibration — Part 1: General requirements*

ISO 5347 (all parts), *Methods for the calibration of vibration and shock pick-ups*

ISO 8041, *Human response to vibration — Measuring instrumentation*

ISO 13090-1, *Mechanical vibration and shock — Guidance on safety aspects of tests and experiments with people — Part 1: Exposure to whole-body mechanical vibration and repeated shock*

ISO 16063 (all parts), *Methods for the calibration of vibration and shock transducers*

### 3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

## 4 General

The measurement and assessment methods given in this document comply with the present practice standardized in ISO 2631-1. The measuring equipment and the frequency weightings shall be in accordance with ISO 8041.

The primary test for the vibration characteristics of the seat involves measurements under conditions which simulate the range of actual uses of a vehicle or machine. For applications where occasional severe shocks or transient vibration can be expected (and in particular for seats whose suspension travel is short, such as those intended for use on industrial trucks or off-road vehicles), in addition to the damping test, a secondary test is required to ensure that the seat responds acceptably. Machinery-specific standards shall give guidance on the need for this secondary test which comprises a method for assessing the accelerations associated with impact with the suspension end-stops when over-travel occurs. The test is described in [Annex A](#).

## 5 Instrumentation

### 5.1 Acceleration transducers

The measuring systems selected for the evaluation of vibration at the seat mounting base or platform of the vibration simulator and that selected for the evaluation of vibration transmitted to the seat occupant, or to an inert mass when used, shall have similar characteristics.

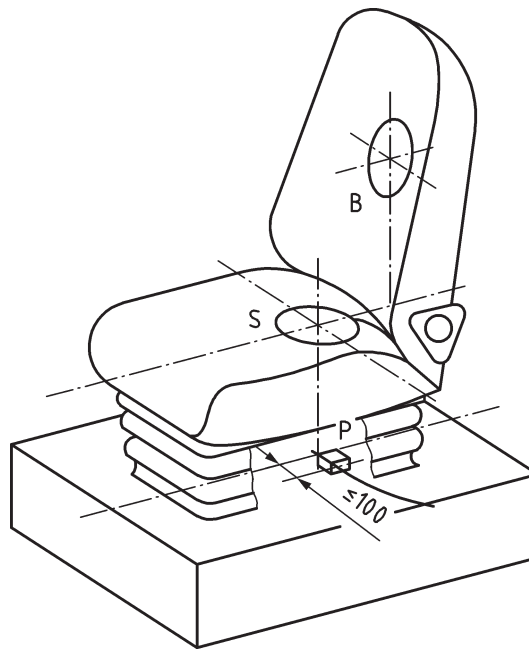
The characteristics of the vibration measuring system, accelerometers, signal conditioning and data acquisition equipment, including recording devices, shall be specified in the relevant application standard, especially the dynamic range, sensitivity, accuracy, linearity and overload capacity.

### 5.2 Transducer mounting

#### 5.2.1 General

One accelerometer for each required test direction shall be located on the platform (P) at the place of the vibration transmission to the seat. The other accelerometer(s) shall be located at the interface between the human body and the seat, at either the seat pan (S) and/or the backrest (B) (see [Figure 1](#)).

Dimensions in millimetres



**Figure 1 — Location of the accelerometers on the platform (P), on the seat pan (S) and on the backrest (B)**

### 5.2.2 Transducer mounting on the platform

The accelerometer(s) on the platform shall be located within a circle with a diameter of 200 mm centred directly below the seat accelerometer(s). The measuring directions shall be aligned parallel to the movement of the platform.

### 5.2.3 Transducer mounting on the seat pan and/or backrest

The accelerometers on the seat pan shall be attached in the centre of a mounting disc with a total diameter of  $250 \text{ mm} \pm 50 \text{ mm}$ . The disc shall be as thin as possible (see [Figure 2](#)). The height shall not be more than 12 mm. This semi-rigid mounting disc of approximately 80 durometer to 90 durometer units (A-scale) moulded rubber or plastics material shall have a centre cavity in which to place the accelerometers. The accelerometers shall be attached to a thin metal disc with a thickness of  $1,5 \text{ mm} \pm 0,2 \text{ mm}$  and a diameter of  $75 \text{ mm} \pm 5 \text{ mm}$ .

The mounting disc shall be placed on the surface of the seat pan and taped to the cushion in such a way that the accelerometers are located midway between the ischial tuberosities of the seat occupant with a tolerance to be defined in the relevant application standards. Alternative positioning of the disc may be recommended for certain applications. Any variation from the position here defined shall be specified in application standards.

When tests are performed without a person sitting on the seat, e.g. during damping tests, the disc shall be placed in the same position as if a person were seated in the seat.

If measurements are made on the backrest, the accelerometers shall be (horizontally) located in the vertical longitudinal plane through the centre-line of the seat. The relevant application standards shall specify the vertical position of the accelerometers. The measurement axes shall be aligned parallel to the basicentric coordinate system.

Besides the semi-rigid mounting disc recommended for soft or highly contoured cushions, a rigid disc with a generally flat surface or an individual-form design may be used. Such discs may be, for instance, required for testing rail vehicle passenger seats. The transducer mounting should be made of low-mass