



**SLOVENSKI STANDARD**  
**SIST EN 836:1998/A2:2001**  
**01-december-2001**

---

**Oprema za nego vrta - Gnane vrtno kosilnice - Varnost**

Garden equipment - Powered lawnmowers - Safety

Gartengeräte - Motorbetriebene Rasenmäher - Sicherheit

Matériel de jardinage - Tondeuses à gazon à moteur - Sécurité

**iTeh STANDARD PREVIEW**  
(standards.iteh.ai)

**Ta slovenski standard je istoveten z: EN 836:1997/A2:2001**  
SIST EN 836:1998/A2:2001  
<https://standards.iteh.ai/catalog/standards/sist/98891bd7-17d6-4467-aa3b-5c328c9e5dd/sist-en-836-1998-a2-2001>

---

**ICS:**

65.060.70      Vrtnarska oprema                      Horticultural equipment

**SIST EN 836:1998/A2:2001**                      **en**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 836:1998/A2:2001

<https://standards.iteh.ai/catalog/standards/sist/9889fd7-17d6-4467-aa3b-5c328c9e5dd/sist-en-836-1998-a2-2001>

ICS 65.060.70

English version

## Garden equipment - Powered lawnmowers - Safety

Matériel de jardinage - Tondeuses à gazon à moteur -  
Sécurité

Gartengeräte - Motorbetriebene Rasenmäher - Sicherheit

This amendment A2 modifies the European Standard EN 836:1997; it was approved by CEN on 4 February 2001.

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

This amendment 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

**(standards.iteh.ai)**

[SIST EN 836:1998/A2:2001](https://standards.iteh.ai/catalog/standards/sist/9889fbd7-17d6-4467-aa3b-5c328c9e5dd/sist-en-836-1998-a2-2001)

<https://standards.iteh.ai/catalog/standards/sist/9889fbd7-17d6-4467-aa3b-5c328c9e5dd/sist-en-836-1998-a2-2001>



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

**Management Centre: rue de Stassart, 36 B-1050 Brussels**

## Foreword

This Amendment EN 836:1997/A2:2001 to the EN 836:1997 has been prepared by Technical Committee CEN/TC 144 "Tractors and machinery for agriculture and forestry", the secretariat of which is held by AFNOR.

This Amendment to the European Standard EN 836:1997 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2001, and conflicting national standards shall be withdrawn at the latest by September 2001.

This Amendment to the European Standard EN 836:1997 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(s).

This amendment which specifically deals with vibration and noise, replaces the "Not yet dealt with" notes in the right hand column of Table A.1 against hazard items 4.1, 4.2 and 5 listed in the left hand column.

Annexes G and H are normative. Annex I is informative.

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

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 836:1998/A2:2001](https://standards.iteh.ai/catalog/standards/sist/9889fbd7-17d6-4467-aa3b-5c328c9e5dd/sist-en-836-1998-a2-2001)

<https://standards.iteh.ai/catalog/standards/sist/9889fbd7-17d6-4467-aa3b-5c328c9e5dd/sist-en-836-1998-a2-2001>

## 2 Normative references

Add the following references

EN 292-2:1991/A1:1995, *Safety of machinery - Basic concepts, general principles for design –Part 2: Technical principles and specifications.*

EN 1032:1996, *Mechanical vibration - Testing of mobile machinery in order to determine the whole-body vibration emission value – General.*

EN 1033:1995, *Hand-arm vibration - Laboratory measurement of vibration at the grip surface of hand-guided machinery – General.*

EN ISO 354:1993, *Acoustics – Measurement of sound absorption in a reverberation room (ISO 354:1985).*

EN ISO 3744:1995, *Acoustics - Determination of sound power levels of noise sources using sound pressure - Engineering method in an essentially free field over a reflecting plane (ISO 3744:1994).*

EN ISO 11201:1995, *Acoustics - Noise emitted by machinery and equipment - Measurement of emission sound pressure levels at a work station and at other specified positions - Engineering method in an essentially free field over a reflecting plane (ISO 11201:1995).*

EN ISO 11688-1:1998, *Acoustics - Recommended practice for the design of low-noise machinery and equipment – Part 1: Planning (ISO/TR 11688-1:1995).*

ISO 4046:1978, *Paper, board, pulp and related terms – Vocabulary.*

## 4 Safety requirements and/or measures

### 4.1 General

Add the following sub-clauses 4.1.12 and 4.1.13:

#### 4.1.12 Vibration

##### 4.1.12.1 Reduction by design and protective measures

The machine shall be designed to generate a vibration level as low as practicable. The main sources causing vibration are the :

- oscillating forces from the engine;
- cutting means;
- unbalanced moving parts;
- impact in gears, bearings and other mechanisms;
- interaction between operator, machine and material being worked;
- machine design related to mobility;
- travelling surface, speed, tyre pressure.

NOTE 1 CR 1030-1:1995, gives general technical information on widely recognised technical rules and means to be followed in the design of machines for low hand-arm vibration solutions.

NOTE 2 Besides the vibration reduction of the source, technical measures to isolate the vibration source from the handle may be used, when appropriate, such as isolators and resonating masses.

##### 4.1.12.2 Reduction by information

After taking possible technical measures for vibration reduction, it is still recommended that, when appropriate, the instruction handbook recommends :

- the use of low-vibration operating modes, and/or limited time of operation;
- the wearing of personal protection equipment (PPE).

#### 4.1.12.3 Vibration measurement

For the measurement of hand-arm and whole body vibration the methods given in Annex G shall be used.

#### 4.1.13 Noise

##### 4.1.13.1 Reduction as a safety requirement

###### 4.1.13.1.1 Reduction at source by design and by protective measures

The machine shall generate a noise level as low as practicable. The main sources causing noise are :

- air intake system;
- engine cooling system (applicable only for combustion engine);
- engine exhaust system (applicable only for combustion engine);
- cutting system;
- vibrating surfaces.

EN ISO 11688-1:1998 gives general technical information on widely recognised technical rules and means to be followed in the design of low-noise machines. For combustion engine driven machines special care shall be taken in the design of the exhaust system and the selection of the silencer.

NOTE EN ISO 11691:1995 and EN ISO 11820 :1996 can be used for the testing of the silencer.

###### 4.1.13.1.2 Reduction by information

If after taking all possible technical measures for reducing noise at the design stage a manufacturer considers that further protection of the operator is necessary, then the instruction handbook shall:

- recommend the use of low-noise operating modes, and/or limited time of operation;
- give a warning of noise level and recommend the use of ear protection.

###### 4.1.13.2 Noise emission measurement

The determination of the sound power level and of the emission sound pressure level at the operator's position shall be carried out using the measurement methods given in Annex H.

## 5 Information for use

### 5.1 Instruction handbook

#### 5.1.1 Assembly, operational and maintenance instructions

*Insert the following paragraph:*

The instruction handbook and the technical documentation describing the machine shall :

- give the declared noise emission values of the machinery in accordance with 1.7.4 f) of Annex A of EN 292-2:1991/A1:1995;
- give reference to the noise test code specified in Annex H;
- give the declared vibration values of the machinery in accordance with 3.6.3 of Annex A of EN 292-2:1991/A1:1995;
- give reference to the vibration test code specified in Annex G.

## Annex A

Amend Table A.1, rows 4.1, 4.2 and 5 as follows:

Hazards		Relevant clauses (informative)		Solutions given by this standard
		EN 292-1	EN 292-2	
4.1	hearing losses (deafness), other physiological disorders (eg. loss of balance, loss of awareness)	4.5	Annex A, 1.5.8, 1.7.4 f)	Dealt with in 4.1.13, 5.1
4.2	interferences with speech communication, acoustic signals, etc.	4.5	Annex A, 1.5.8, 1.7.4 f)	Dealt with in 4.1.13, 5.1
5	Hazards generated by vibration (resulting in a variety of neurological and vascular disorders)	4.6	Annex A, 1.5.9, 3.6.3	Dealt with in 4.1.12

Add the following Annexes G and H (normative) and Annex I (informative):

## iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN 836:1998/A2:2001

<https://standards.iteh.ai/catalog/standards/sist/9889fbd7-17d6-4467-aa3b-5c328c9e5dd/sist-en-836-1998-a2-2001>

## **Annex G (normative)**

### **Vibration**

#### **G.1 Quantities to be measured**

The values measured shall be:

- weighted r.m.s acceleration according to 3.1 of EN 1033:1995 for hand-arm vibration and 4.3 of EN 1032:1996 for the whole-body vibration;
- maximum operating engine/motor speed obtainable (see 3.19). Sealed adjustments shall not be moved when checking the maximum operating speed.

#### **G.2 Instrumentation**

##### **G.2.1 General**

Tachometers shall have an accuracy of  $\pm 2,5$  %. For specification of other instrumentation see clause 4 of EN 1033:1995 for the hand-arm vibration measurement, and see clause 5 of EN 1032:1996 for the whole body vibration measurement.

##### **G.2.2 Fastening of transducer**

For fastening the transducer, 4.2 of EN 1033:1995 shall apply. For the whole body vibration, 5.2 of EN 1032:1996 shall apply. If a resilient coating is being used between the hand and vibration structure (for example, a cushioned handle or steering wheel), it is permissible to use a suitable mounting for the transducer (for example, a thin suitably formed metal sheet) placed between the hand and the surface of the resilient material. In either case, care shall be taken that the size, shape and mounting of the transducer or of the special transducer support does not significantly influence the transfer of vibration to the hand. Care shall also be taken when mounting the transducer that the transfer function is flat up to 1,5 kHz for all three directions.

##### **G.2.3 Calibration**

Calibration shall be in accordance to 4.7 of EN 1033:1995 for the hand-arm vibration and be in accordance to 5.6 of EN 1032:1996 for the whole-body vibration.

#### **G.3 Measurement direction and measurement location**

##### **G.3.1 Measurement direction**

Measurements shall be made simultaneously for the three (3) directions x, y and z (see Figure G.1 for pedestrian controlled and Figure G.2 for ride-on).

##### **G.3.2 Measurement location**

A maximum of two transducers shall be used for hand-arm vibration and one for whole-body vibration. The transducer(s) for the hand-arm vibration measurements shall be placed where an operator holds the steering device(s) according to Figure G.1 or Figure G.2. The transducer for the whole-body vibration measurement shall be placed according to 4.2 of EN 1032:1996.

#### **G.4 Test procedure**

##### **G.4.1 Determination of working procedure**

Measurements shall be carried out on a new, normal production machine featuring standard equipment with the machine provided by the manufacturer.

The machine shall be maintained and serviced in accordance with the manufacturers instructions. Before the test is commenced the engine shall be run with the cutting means engaged until stable conditions are reached.

For electrical powered machines the rated voltage or the upper limit of the rated voltage range and/or frequency shall be maintained during the test at 0,98 to 1,02 times the stated values. The supply voltage of mains powered



machines is measured at the plug of the cable or cord supplied, not at the plug of any extension cable or cord. Battery powered machines shall be powered by an external power source maintained at the nominal voltage of the battery.

The hands of the operator shall be in the designated gripping area, close to the transducer. The operator shall be in the normal operating position. Tyre pressures shall be in accordance with the manufacturers specifications. When the machine is designed to be operated with a grass catcher, the measurement shall be carried out with this configuration. The grass catcher shall be empty. The fuel tank shall be full. The machine shall be tested with all attachments provided for by the manufacturer.

The measurements shall be carried out with an operator who shall be  $1,75\text{ m} \pm 0,05\text{ m}$  tall. Additionally, for ride-on machines, the operator shall weigh  $75\text{ kg} \pm 5\text{ kg}$ .

NOTE The vibration measurements are influenced by the operator. He should therefore be familiar with the normal operation of the machine (see 3.22).

## G.4.2 Hand-arm vibration

Testing shall be carried out with the machine stationary and at the maximum operating engine speed.

### G.4.2.1 Pedestrian controlled machines

Adjustable handles of pedestrian controlled machines shall be set to suit the operator. The cutting height shall be set to 30 mm or the next higher cutting position when set on a hard level surface. Machines with a maximum cutting height setting of 30 mm or less shall be set at their maximum height setting. Measurements shall be carried out on a surface in accordance with Annex E 1.

### G.4.2.2 Ride-on machines

If the seat and the steering devices of ride-on machines are adjustable they shall be set to suit the operator.

## G.4.3 Whole body vibration

Whole-body vibration measurement shall be carried out with the machine travelling in a straight line at a speed closest to 6 km/h on a level freshly cut lawn. The height of cut shall be set at the lowest position.

NOTE The results of this test will not necessarily be representative of the conditions of use and are likely to under-represent the vibration level that could be met. The whole-body vibration surface will be reviewed at the next revision taking into account ongoing research.

## G.5 Measurement procedure

For each transducer position a series of five tests shall be carried out using one operator.

NOTE 1 Issues such as validity of test and number of test operators are to be considered for future revision in the light of experience gained using the present test method.

Each reading shall be obtained from a signal time suitable for the test equipment being used. Duration of the test shall not be less than 8 s.

NOTE 2 An equivalent level of accuracy may be achieved by using a shorter duration than 8 s. In this case equivalence of the results should be justifiable.

Measurement for the three directions shall be made simultaneously.

## G.6 Determination of the measurement result

### G.6.1 Hand – arm

The measurement result of each hand position shall be determined as the arithmetic mean over the  $a_{h,W}$  values of each test. If a single figure is quoted it shall be the higher of the two.

### G.6.2 Whole body

The measurement result shall be determined as the arithmetic mean over the  $a_{h,W}$  values of each test.