TECHNICAL REPORT 5007

Published 1980-11-01

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Agricultural wheeled tractors — Operator seat — Measurement of transmitted vibration

Tracteurs agricoles à roues — Siège du conducteur — Mesurage des vibrations transmises

Technical Report 5007 was drawn up by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, and approved by the majority of its members. The reasons which led to the decision to publish the document in the form of a Technical Report are given in the introduction.

In July 1980, this document was submitted to the ISO Council, which approved its publication as a Technical report.

0 Introduction

This document is issued as a Technical Report owing to lack of national support for the procedure as an International Standard as well as an identification of several areas where more knowledge and experience are essential.

The parts where more information is needed before this document can be published as an International Standard are particularly :

- vibration rig excitation data;
- the effect of rig geometry on measured seat performance;
- dynamic range of accelerometers and associated instrumentation;
- ridemeter filter tolerances;
- the importance of vibration above 10 Hz frequency;
- application means for lateral stability test force;
- characteristics for the classification of tractors.

UDC 631.372 : 629.11.014 : 534.1.08 Ref. No. ISO/TR 5007-1980 (E)

Descriptors : agricultural machinery, tractors, ground vehicle seats, tests, vibration tests, vibration, human factors engineering, test results.

Printed in Switzerland

Price based on 29 pages

1 Scope

This Technical Report specifies methods for the measurement of the effectiveness of the seat in reducing the vertical whole-body vibration transmitted to the operator of an agricultural tractor, and methods for the measurement of other seat characteristics.

The measurements specified relate to :

a) vertical vibration of the seat suspension system and weighted acceleration of the vibration on the seat;

b) load/deflection characteristic of the seat suspension system;

c) lateral stability of the seat;

d) dimension of the seat and its vertical and horizontal adjustment.

NOTES

1 Vibration which reaches the operator other than through his seat, for example that sensed by the feet through the platform or controls, is not covered.

2 The important characteristics of seat construction include the dimensions of the seat cushion and supporting parts such as back and arm rest, and the range of operator mass for which isolation from vibration is measured.

3 The measurement of whole-body vibration along the three principal axes is covered by ISO 5008.

2 Field of application

This Technical Report applies to seats which may be fitted either to specified models of agricultural wheeled tractors or to a group of models which have similar vibration characteristics. It is recognized that there may be designs of tractors, for example, stilt-tractors, tricycle tractors, hillside tractors or vineyard tractors, etc., for which this Technical Report is not appropriate.

3 References

ISO 2041, *Vibration and shock — Vocabulary.*

ISO 2631, *Guide for the evaluation of human exposure to whole-body vibration.*

ISO 3411, *Earth-moving machinery — Human physical dimensions of operators and minimum operator space envelope.*

ISO 3462, *Agricultural tractors and machinery — Seat reference point.*[1)]

ISO 4253, *Agricultural tractors — Operator's seating accommodation.*

ISO 5008, *Agricultural wheeled tractors and field machinery — Measurement of whole-body vibration of the operator.*

IEC Publication 225, *Octave, half-octave and third-octave band filters intended for the analysis of sounds and vibrations.*

1) At present at the stage of draft.

4 General

4.1 The specification of instruments, test facility characteristics and vibration assessment should allow measurements to be made and reported with acceptable precision.

4.2 Methods are defined for classifying tractors into groups which have similar vibration characteristics and for choosing reference tractors to be representative of such groups.

4.3 Two alternative methods are given for measuring the vertical vibration of the seat suspension system : either

a) using a vibration test sand (for all classified tractors), or

b) using a test track (as an alternative for tests for seats on non-classified tractors).

4.4 The vibration is evaluated in accordance with ISO 2631. The procedure includes means of weighting the vibration level at different frequencies to take account of agreed approximations to the frequency sensitivity of the human operator.

5 Definitions

For the purposes of this Technical Report, the following definitions shall supplement those of ISO 2041.

5.1 ride vibration : Vertical vibration in the frequency range covered by 1/3 octave bands centred from 1 to 80 Hz transmitted through the driver's seat.

5.2 weighted vibration : Measured vibration acceleration modified by the frequency-weighting.

5.3 vibration transmission factor : Ratio of weighted vertical acceleration vibration measured on the seat to that measured at the point of the seat attachment.

5.4 vibration class : Class or group of tractors which show the same vibration characteristics at the seat attachment point.

5.5 classified tractor : Tractor, the vibration behaviour of which is classified in a vibration class because of similar ride vibration features.

5.6 non-classified tractor : Tractor which has not been classified in a defined vibration class.

5.7 reference tractor : Tractor, the vibration behaviour of which is characterised by the output spectra of the vibration rig when testing a seat for a given vibration class of tractors.

5.8 unladen tractor : Tractor in working order with full tanks and radiators, but less the mass of the operator and without removable ballast weights, special equipment or loads.

6 Tolerances

Unless otherwise stated, the following tolerances shall apply :

— for all specified values : ± 5 %

Linear dimensions shall be recorded to the nearest integral unit.

The measuring accuracy of the instruments used shall be within the following limits :

— for linear measurements : ± 0,5 %

— for angular measurements : ± 0,25°

— for determination of tractor mass : ± 0,5 %

— for measurement of tyre pressure : ± 10 kPa

7 Vibration measurements

7.1 Vibration transducers and amplifiers

The vibration shall be sensed by acceleration transducers (accelerometers), one of which shall be attached to the rigid part of a disc of 250 ± 50 mm diameter of which the centre part shall be rigid to a diameter of 75 ± 5 mm (a typical arrangement is shown in figure 1). The transducer should preferably be protected by a rigid cover. The disc, which may be covered with 20 mm thick resilient material, shall be placed between the operator and the centre of the seat.

A second transducer shall be mounted on the seat attachment, where it is mounted on the tractor or cab, at a point not more than 100 mm from the longitudinal centreline of the seat, if possible, not outside the vertical projection of the seat cushion, and in any event neither outside the rear of this projection nor more than 50 mm outside the front edge of this projection.

The transducers together with their associated amplifiers shall be sensitive to vibration levels of 0,05 m/s^2 and shall be capable of measuring vibrations of 5 m/s^2 r.m.s. with a crest factor (ratio of peak to r.m.s. value) of 3 without distortion and with an accuracy of ± 2,5 % of the actual r.m.s. reading.

In the range 1 to 80 Hz the frequency response shall not vary by more than 5 %.

7.2 Magnetic tape recorder

The electrical signals generated by the transducers may be recorded for later analysis on magnetic tape.

The magnetic tape recorder shall have a replay accuracy of better than ± 3,5 % over the frequency range 1 to 80 Hz including any change of tape speed made during replay for the purpose of analysis.

7.3 Frequency weighting

Frequency weighting shall be achieved by direct use of electrical filters in a frequency weighting "ride-meter". Where more detailed information is required, analysis of the acceleration into 1/3 octave band levels and weighting of the levels may be carried out.

NOTE — Vibration above 10 Hz may be disregarded. When a vibration meter is used, it may be connected with a low-pass filter with a cut-off frequency of 10 Hz and a high-frequency attenuation increasing by 12 dB/octave.

7.3.1 Frequency-weighting "ride-meter"

The "ride-meter" shall consist of an electronic weighting network incorporated between the transducer and a time integration stage. The weighting network shall have an insertion loss according to the curve in figure 2. The loss shall not deviate from the curve by more than ± 0,5 dB from 2 to 4 Hz and ± 2 dB at all other frequencies.

The integration stage shall be capable of indicating the integral (I) of the square of weighted vibration acceleration (a_w^2) for the time period of the test run (T), or its square root (I'), that is :

$$I = \int_{t=0}^{T} a_w^2 \, dt \quad \text{or} \quad I' = \sqrt{\int_{t=0}^{T} a_w^2 \, dt}$$

or directly the r.m.s. value ($A_{w\,eff}$) of the weighted vibration acceleration, that is :

$$A_{w\,eff} = \sqrt{\frac{I}{T}} = \frac{\sqrt{I}}{\sqrt{T}}$$

The overall accuracy of the r.m.s. value of the weighted vibration acceleration thus determined shall lie within ± 5 %.

7.3.2 Frequency analysis method

7.3.2.1 Analyse each vibration recording into 1/3 octave component accelerations over the frequency range 1 to 80 Hz, the 1/3 octave centre frequencies being in compliance with IEC Publication 225, which shall, however, be extrapolated for the lower frequencies.

7.3.2.2 Average the root mean square (r.m.s) value of each component (b_f) over the duration specified for the measurement.

7.3.2.3 Multiply 1/3 octave values by weighting factors (w_f) listed in table 1, and calculate a weighted acceleration (B_w) value for each recording as the square root of the sum of the squares of the weighted 1/3 octave values, that is :

$$B_w = \sqrt{\sum_{f=1}^{80} w_f^2 \, b_f^2}$$

Table 1 — Weighting factors relative to the frequency range of maximum acceleration sensitivity

Frequency, f (centre frequency of 1/3 octave band) Hz	Weighting factor, w_f
1,0	0,50 = − 6 dB
1,25	0,56 = − 5 dB
1,6	0,63 = − 4 dB
2,0	0,71 = − 3 dB
2,5	0,80 = − 2 dB
3,15	0,90 = − 1 dB
4,00	1,00 = 0 dB
5,00	1,00 = 0 dB
6,3	1,00 = 0 dB
8,00	1,00 = 0 dB
10,00	0,80 = − 2 dB
12,5	0,63 = − 4 dB
16,0	0,50 = − 6 dB
20,0	0,40 = − 8 dB
25,0	0,315 = − 10 dB
31,5	0,25 = − 12 dB
40,0	0,20 = − 14 dB
50,0	0,16 = − 16 dB
63,0	0,125 = − 18 dB
80,0	0,10 = − 20 dB

7.4 Calibration

The entire measurement and analysis equipment shall be regularly calibrated, where possible in accordance with existing standards or recommendations.

8 Operators

Two operators shall be used in each test; one a light operator with a mass of 55 kg ± 10 %, of which not more than 5 kg may be contributed by ballast carried in a belt; the other a heavy operator with a mass of 98 kg ± 10 %, with not more than 8 kg of this mass carried in a belt (see ISO 3411).

9 Classification of tractors

9.1 General

For the purpose of measuring the vibration performance of seats, the vibration behaviour of a classified tractor (see 5.5) may be represented by a single reference vibration spectrum which is typical of the spectral power density of the vertical acceleration recorded at the seat attachment point of the reference tractor (see 5.7).

9.2 Classifiable tractors (category A)

9.2.1 A classifiable 2-axle tractor shall have the following characteristics :

Axle load distribution :	Front : 30 to 45 % of unladen mass Rear : 70 to 55 % of unladen mass
Tyres :	Front smaller than rear (radius of front ⩽ 0,8 times radius of rear)
Track width :	Smallest adjustable track width greater than 1 150 mm
Suspension :	Rear axle unsprung
Longitudinal position of seat reference point :	Between axis of rear wheels and centre of gravity of tractor

9.2.2 Category A 2-axle tractors are divided into the following classes :

- Class 1 : 1 400 to 3 600 kg unladen tractor mass;
- Class 2 : 3 601 to 5 000 kg unladen tractor mass.

9.3 Reference tractor

9.3.1 General

The reference tractor is defined by the spectral power density of the vertical acceleration (figures 3 and 4) recorded at the point of seat attachment of the reference tractor during a run on the standard test track (see 11.2.1) at a speed of 12 ± 0,5 km/h.

The technical data of the reference tractors will probably correspond with the approximate values of table 2.

Table 2 — Technical data of reference tractors

Technical data	Class 1	Class 2
Unladen mass, kg	3 040	4 750
Front axle load, kg	1 300	1 830
Rear axle load, kg	1 740	2 920
Front tyres	7,50-18	12,4/11-28
Rear tyres	16,9/14-34	16,9/14-38
Front tyre pressure, kPa	200	150
Rear tyre pressure, kPa	110	130
Wheelbase, mm	2 125	2 590

9.3.2 Class 1

The spectral power density (ϕ) of the vertical vibration acceleration at the seat attachment of the Class 1 reference tractor (figure 3) can be approximately expressed by the following equation :

$$\phi = \phi_{max} \exp - \frac{(f - f_m)^2}{2\, b^2}$$

where the constants have the values :

$\phi_{max} = 6,0\ (m/s^2)^2/Hz$

$f_m = 3,25\ Hz$

$b = 0,33\ Hz$

The permitted tolerances are :

$\phi_{max} = \pm 10\ \%$

$f_m = \pm 5\ \%$

The tolerance on b is determined by the fact that the weighted vibration acceleration at the seat attachment must be within the limits :

$a_{wB} = 1{,}9$ to $2{,}2\ m/s^2$

9.3.3 Class 2

The spectral power density (ϕ) of the vertical vibration acceleration at the seat attachment of the Class 2 reference tractor (see figure 4) can be approximately expressed by the following equation :

$$\phi = \phi_{max} \exp - \frac{(f - f_m)^2}{2\,b^2}$$

where the constants have the values :

$\phi_{max} = 5{,}5\ (m/s^2)^2/Hz$

$f_m = 2{,}65\ Hz$

$b = 0{,}3\ Hz$

The permitted tolerances are :

$\phi_{max} = \pm 10\ \%$

$f_m = \pm 5\ \%$

The tolerance with respect to b is determined by the fact that the weighted vibration acceleration at the seat attachment must be within the limits :

$a_{wB} = 1{,}6$ to $1{,}8\ m/s^2$

9.4 Non-classifiable tractors (category B)

A non-classifiable tractor has characteristics such that it cannot be included in a class in category A.

10 Test methods

10.1 Selection of test method

10.1.1 A seat intended for use on a class or classes of category A tractors shall be tested on a vibration test stand using the appropriate control signals.

Seats tested for Class 2 tractors are to be deemed suitable also for Class 1 tractors.

10.1.2 A seat intended for use on a category B tractor shall be tested on the model of tractor on which it will be used, either on the standard test track or on the vibration test stand using as control signal an input corresponding to the acceleration curve determined during a test on the standard track with the model of tractor on which the seat will be used.

10.2 Test procedure

10.2.1 Tests shall be carried out on the same seat and in the following sequence :

a) measurement of dimensions (see clause 14);

b) determination of load/deflection characteristics of the suspension system (see clause 12);

c) lateral stability (see clause 13);

d) vibration tests (see clause 11).

10.2.2 The seat (and tractor, if applicable) submitted for test shall conform in respect of construction and fittings, insofar as these are related to the characteristics to be tested, with seats or tractors supplied in series production.

10.2.3 Before the tests are carried out, the seat shall be run in as specified by the seat manufacturer, to bring it to a normal operating condition.

10.2.4 The seat reference point shall be determined in accordance with ISO 3462.

11 Vibration tests

11.1 General

11.1.1 Condition of tractor

11.1.1.1 The tractor shall be fitted with a protective frame and/or cab unless it is of a type for which this equipment is not required. It shall not carry any auxiliary equipment and there shall be no ballast or liquid in the tyres.

11.1.1.2 The tyres shall be the standard size for the tractor, as specified by the manufacturer. The depth of tread shall be not less than 65 % of the depth of a new tread and the tyre walls shall not be damaged.

11.1.1.3 Except for reference tractors, the tyre pressures shall be the arithmetic mean of the ranges recommended by the tractor manufacturer.

11.1.1.4 The track setting shall be that which is usual for normal field work, as recommended by the manufacturer.

11.1.2 Condition of seat

11.1.2.1 The seat shall be set for the mass of the operator in accordance with the manufacturer's instructions.

11.1.2.2 The seat position shall be set horizontally and vertically to suit the operator's stature.

11.1.3 Values to be reported

11.1.3.1 During each test, the weighted vibration acceleration for the whole test time shall be determined with the direct-reading vibration meter specified in 7.3.1 or by 1/3 octave analysis of the recorded acceleration signals. The arithmetic mean values of the corrected seat vibration acceleration for the light operator and for the heavy operator shall be reported.

11.1.3.2 The report shall also contain the ratio of the weighted vibration acceleration on the operator's seat to the weighted vibration acceleration at the point of seat attachment. This ratio shall be given to two decimal places.

11.1.3.3 The ambient temperature range during the tests shall be measured and included in the report.

11.2 Test on vibration stand

11.2.1 Test stand

11.2.1.1 Physical characteristics

The moving part of the vibration test stand shall consist of a platform the dimensions of which corresponds approximately with those of the operator platform of a tractor and on which there is an attachment for the seat to be tested, a steering wheel, and a toe-stop. The general arrangement and main dimensions shall be as shown in figure 5.

The stand shall be flexurally and torsionally stiff and the bearings and guides shall not provide unnecessary freedom.

The stand shall be constrained to travel in an essentially vertical direction and be free from resonances and non-linearities which would distort the output vibration beyond the correction capability of signal compensation.

If the platform is carried on an arm, as shown in figure 5, the radius from the arm pivot to the centre of the seat attachment shall be at least 2 000 mm.

The stand shall be capable of simulating sinusoidal vibrations in accordance with figure 6 when loaded with a mass of 150 kg.

11.2.1.2 Signal generation

The vibrations shall be generated by means of a servo-controlled electro-hydraulic actuator. The system shall have dynamic response capable of driving the mounting base of the loaded seat in accordance with the defined test spectra.

The transfer function characteristics of the equipment may be compensated for during the synthesis of the command input signal in order that the vertical output power spectral density and probability density distribution of acceleration amplitudes requirements are satisfied at the seat mounting base. Any appropriate digital or analogue method may be used to generate the command signal provided that the output power spectral density and probability density distribution of acceleration amplitudes requirements are satisfied at the seat mounting base. For tests on category A tractors, the probability density distribution of the total input vibration shall be approximately Gaussian.

The test input vibration shall produce the appropriate spectrum of vertical vibration at the seat attachment point according to the class of category A tractor for which the operator seat is intended, or it shall be the double-integrated acceleration signals recorded, at the point of seat attachment, on the model of category B tractor on which the operator seat is to be used whilst travelling on the standard test track at 12 ± 0,5 km/h.

One method of synthesising the input signal for category A class 1 and class 2 tractors is given in the annex.

11.2.1.3 Safety requirements

The vibration test stand shall have failsafe provisions capable of automatic shutdown when the seat mounting base acceleration exceeds 15 m/s² for any reason. It is preferred that this provision be a hydraulic means, such as a supply pressure relief valve and/or a load-limiting valve across the piston of the actuator cylinder.

The pump and/or servo-valves shall be sized to limit the test stand velocity to 1,3 m/s, and the accumulator shall be of the minimum size required to provide the proper system response.

Failsafe shutdown switches shall be provided for both the operator in the test seat and the operator of the test facility. The shutdown switches shall shut down the hydraulic power supply and actuate a valve to release the system hydraulic pressure.

11.2.2 Procedure

11.2.2.1 Mount the seat to be tested on the vibration test stand in accordance with the arrangement in figure 5.

Operate the vibration test stand to produce the appropriate input signals to the seat, as given in 11.2.1.2, and measure the weighted vibration acceleration on the seat over a period of 28 s.

11.2.2.2 The vibration test stand shall be so adjusted that there is a weighted acceleration (a_{wB}) at the point of seat attachment within the following ranges :

Category A, class 1 tractor : a_{wB} = 1,9 to 2,2 m/s²

Category A, class 2 tractor : a_{wB} = 1,6 to 1,8 m/s²

The value a_{wB} actually present at the seat attachment point during the test shall be determined. If this deviates from the reference value :

a^*_{wB} = 2,05 m/s² for category A, class 1

a^*_{wB} = 1,7 m/s² for category A, class 2

the acceleration a_{wS} measured on the operator seat shall be corrected by use of the equation :

$$a^*_{wS} = a_{wS} \times \frac{a^*_{wB}}{a_{wB}}$$

11.2.2.3 At least two test runs shall be made for each operator. If the results differ by more than ± 5 % from the arithmetic mean, resolve the discrepancies by further repeat measurements.

11.3 Test on standard test track

11.3.1 Standard test track

The standard test track shall be an artificial track consisting of two parallel strips adapted to match the wheel track width of the tractor. The surface of each track strip is defined by ordinates of elevation with respect to an arbitrary base line as given in table 3.

The length of the standard test track shall be 100 m.

11.3.2 Procedure

11.3.2.1 With the tractor travelling at a speed of 12 ± 0,5 km/h, maintained without using the brakes, measure the vertical vibration on the seat and at the point of seat attachment on the tractor, beginning when the axis of the tractor rear wheels is over point $D = 0$ in table 3 and ending when the axis of the front wheels is over point $D = 100$ in table 3.

11.3.2.2 At least two test runs shall be made for each operator. If the results differ by more than ± 5 % from the arithmetic mean, resolve the discrepancies by further repeat measurements.

12 Determination of suspension system load/deflection characteristics

12.1 The maximum and minimum values for the adjustment of the seat for the operator's mass shall be calculated from the suspension characteristic curve measured in a static test. This determination of the suspension characteristic shall be undertaken at the extremes of adjustment for operator mass. If the design of the seat allows the suspension travel to be influenced by the vertical adjustment of the seat, the characteristic shall be determined at both extremes of this adjustment.

12.2 To determine the static characteristic, the seat shall be mounted in a test stand and a force shall be applied either directly or through a mechanism. The suspension system depression shall be measured with an accuracy of 1 % of the maximum deflection.

12.3 A complete characteristic curve shall be taken from zero force to maximum and back to zero. The force steps at which the suspension system depression is measured shall not be greater than 100 N; at least eight points shall be plotted at approximately equal intervals of the movement of the suspension. The maximum force shall be taken either as that at which no further suspension system depression can be measured, or as 1 500 N, whichever is the lesser.

After application or removal of the force, the vertical depression of the suspension system shall be measured 200 mm in front of the seat reference point. After application or removal of the force, sufficient time shall be allowed to ensure that the seat is at rest.

12.4 In seats without fixed limits for the operator mass adjustment, the settings shall be so chosen that :

a) for minimum operator mass, the seat just returns to the top limit of free suspension travel (see explanation below) when the force is removed :

b) for maximum operator mass, the force of 1 500 N just depresses the seat to the lower limit of free suspension travel (see explanation below).

In this case, it shall be reported that the operator mass adjustment range is greater than that measured.

12.5 Full travel of the suspension shall be taken as the movement from the highest limiting position, defined as the position taken up by the suspension adjusted for the maximum operator mass with no external force applied, to the lowest limiting position, defined as the position taken up by the suspension adjusted for the minimum operator mass with a vertical force of 1 000 N applied.

Free travel of the suspension shall be taken as the movement from the position taken up by the suspension when just touching the upper limit stop to the position when the suspension just touches the lower limit stop.

12.6 The maximum range of adjustment for the operator's mass shall be determined by multiplying by 1,3 the values for the load adjustment range determined as below. In addition, the free suspension travel determined, where necessary, at the two extremes of vertical adjustment shall be reported.

By "load adjustment range" is meant the range between the two loads corresponding to the mean position in the suspension system load/deflection characteristic between the settings for the maximum and minimum operator masses. Since the spring characteristics are, in general, hysteresis loops, a central line shall be drawn through the loop (see figure 7, points A and B) for the determination of the load application.

By "mean position" is meant that position which the seat assumes when it is depressed by half the full travel of the suspension.

13 Determination of lateral stability

13.1 Condition of seat

The seat shall be adjusted, as far as possible, to the maximum permissible operator mass setting and fixed to a stand so that its base plate or structure is clamped against a rigid plate not smaller than the seat itself.

13.2 Procedure

13.2.1 Apply a force of 1 000 N to the surface or cushion of the seat or to the cushion supporting structure at a point 200 mm in front of the seat reference point and 150 mm on one side of the longitudinal plane of symmetry through the seat, making provision to accommodate the angular deflection of the seat at the point of application.

13.2.2 Measure the lateral angles of inclination of the cushion supporting structure at the end settings of horizontal and vertical seat adjustments.

13.2.3 Repeat the procedure given in 13.2.1 and 13.2.2 with the force applied on the other side of the longitudinal plane of symmetry through the seat.

14 Measurement of dimensions

The following dimensions shall be measured :

14.1 Depth of seat surface.

The horizontal distance between the seat reference point and the front limit of the padded part of the seat measured parallel to and 150 mm from the longitudinal mid-plane of the seat.

14.2 Width of seat surface.

The horizontal distance across the seat measured 150 mm in front of the seat reference point and not more than 80 mm vertically above it.

14.3 Height of backrest.

The vertical distance of the upper limit of the padded part of the backrest (not its supporting structure) above the seat reference point.

If the supporting structure protrudes above this upper limit, this shall be reported.

14.4 Range of horizontal adjustment.

14.5 Range of vertical adjustment.

14.6 Angle of seat surface to the horizontal.

The angle, measured in a longitudinal plane, made by the surface of the loaded measuring device used in ISO 3462.

15 Specimen report form

1 Name and address of manufacturer ....
....

2 Model of seat ....

3 Test details

a) Standardized track/vibration stand ....

b) Category ....

c) Class ....

4 Tractor details (category B tractor only)

a) Make and model ....

b) Mass (total) .... kg (front) .... kg (rear) .... kg

c) Whether protective cab or frame fitted ....

d) Tyres fitted :

— Front : Type and size .... Pressure .... kPa

— Rear : Type and size .... Pressure .... kPa

e) Operator position (for example, rear, mid-mounted or front) ....
....

f) Track setting .... mm

5 Dimensions

a) Depth of seat .... mm

b) Width of seat .... mm

c) Height of backrest .... mm

d) Range of horizontal adjustment .... mm

e) Range of vertical adjustment .... mm

f) Angle of seat surface to the horizontal .... degrees

6 Suspension system characteristics

a) Range of adjustment for operator's mass .... kg to .... kg

b) Free suspension travel .... mm

c) Full suspension travel .... mm

7 Lateral stability

Maximum lateral angle of inclination .... degrees