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Forestry machinery — Portable chain-saws — Non-manually actuated chain brake performance

Matériel forestier — Scies à chaîne portatives — Performance du frein de chaîne automatique

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 13772 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture*, Subcommittee SC 17, *Manually portable forest machinery*.

This second edition cancels and replaces the first edition (ISO 13772:1997), which has been technically revised.

This corrected version of ISO 13772:2004 incorporates the following corrections.

— The engine displacement limits given in the captions to Figure 1 b) and c) have been corrected from $\leqslant 80\ cm^3$ and $> 80\ cm^3$ to $\leqslant 40\ cm^3$ and $> 40\ cm^3$, respectively. There had been no intention to change these values from those previously given in the 1997 edition.

Introduction

This International Standard was developed in response to worldwide demand for a test method and criteria for acceptance initiation of non-manually actuated chain brakes.

Forestry machinery — Portable chain-saws — Non-manually actuated chain brake performance

1 Scope

This International Standard specifies the method of checking the function of the non-manually actuated chain brake on portable hand-held chain-saws used in forestry, and gives performance requirements.

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.

ISO 6531, *Machinery for forestry — Portable hand-held chain-saws — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6531 apply.

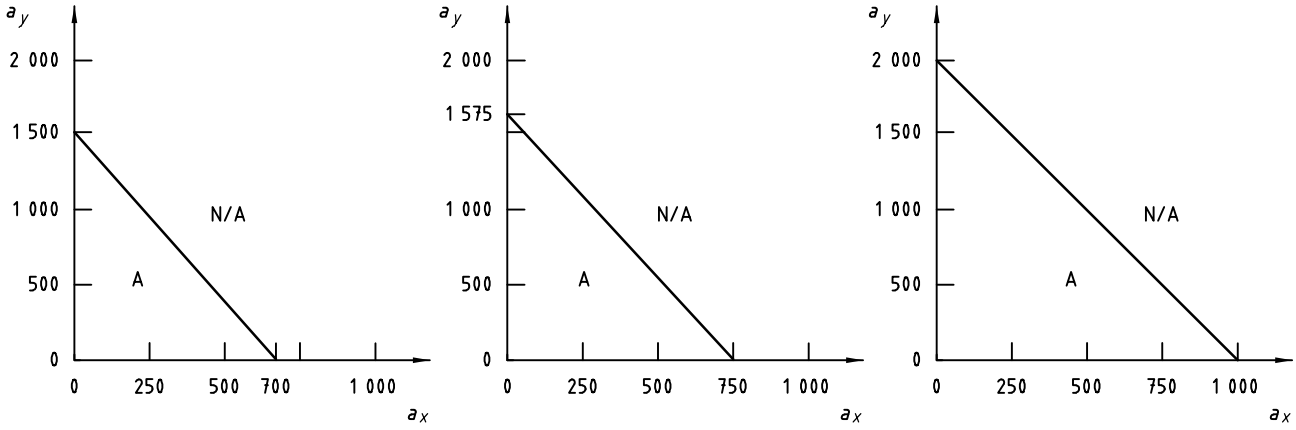
4 Performance requirements

The non-manually actuated chain brake function shall be checked on a normal production saw equipped with a specified guide bar. If no specification is given for the guide bar, the bar length shall be in accordance with Table 1, without a sprocket. The chain-saw shall be in a new and clean condition. Deviations shall be reported in the test report (see Clause 9).

Table 1 — Corresponding values of engine displacement and length of guide bar

Engine displacement C cm^3	Effective length of guide bar L m
$C < 45$	$0{,}25 \leqslant L < 0{,}35$
$45 \leqslant C < 70$	$0{,}30 \leqslant L < 0{,}40$
$70 \leqslant C < 90$	$0{,}40 \leqslant L < 0{,}50$
$90 \leqslant C$	$0{,}50 \leqslant L$

When tested in accordance with Clause 8, the non-manually chain brake actuation function is considered acceptable if each of the horizontal and vertical acceleration levels, a_x and a_y, at which the chain brake actuates is below the appropriate limit line according to Figure 1 a), b) or c), depending on chain-saw type and size.



a) Chain-saw for tree service

b) Chain-saw for forest service with $\leqslant$ 40 cm^3 engine displacement

c) Chain-saw for forest service with > 40 cm^3 engine displacement

Key

a_x horizontal acceleration, m/s^2

a_y vertical acceleration, m/s^2

A acceptable

N/A not acceptable

Figure 1 — Threshold levels for actuation of non-manually actuated chain brakes

5 Principle

The chain-saw is mounted on a test rig as shown in Figure 2. The drop mass falls from a defined height on the rocker and accelerates the chain-saw on the opposite side. The drop height is increased until an actuation of the non-manually actuated chain-brake occurs.

6 Test equipment

6.1 Acceleration measuring equipment

The total mass of the accelerometer(s) shall be as low as possible and shall not in any case exceed 50 g, including the mounting but excluding the cables.

The signal from the accelerometer(s) shall be processed by a low-pass filter with characteristics according to Annex A.

Care shall be taken when mounting the accelerometer so that the transfer function is flat up to 300 Hz for both measuring directions. For general considerations concerning accelerometer mounting, see ISO 5348. The transfer function may be considered flat if an addition of mass to the accelerometer equal to that of the accelerometer does not have any significant influence on a_x and a_y. This additional mass should be placed between the accelerometer and its mounting if the mass is of metal, or around the accelerometer if the mass consists of materials such as clay or wax.

The accuracy of the measuring equipment, excluding the accelerometer mounting and filter, shall be $\pm$ 5 % of registered value in the frequency range 0 Hz to 300 Hz. See ISO 16063-1 for calibration methods.

6.2 Test rig

The design principles of the test rig shall be in accordance with Figure 2.

The test rig cord length, as well as the longitudinal and lateral positioning of the pivoting pulley for the cord, shall be adjustable.

The test rig rocker shall be made of a rectangular hollow steel section, 80 mm × 40 mm × 4 mm.

The drop weight device shall have a drop mass of 15 000 g ± 20 g. It shall be possible to select drop heights in steps of 10 mm or less, at least between a drop height of 200 mm to 1 400 mm. The accuracy of the drop height shall be ± 2 mm.

The spring in the drop weight device shall have a characteristic of 640 N/mm ± 20 N/mm for an increasing spring load.

NOTE The specified spring rate can be achieved using seven leaf springs (45 mm × 22,4 mm × 1,75 mm), each having an adverse orientation to the other. The spring defines the length and the characteristic of the impulse. The pulse of the simulated kickback will then be approximately 10 ms.

7 Preparation

Prepare the chain-saw for testing as follows.

a) Check that the chain-saw is in accordance with the product specification. If no guide bar length has been specified, choose one according to Table 1.

b) Precondition the saw by actuating the non-manually actuated chain brake 10 times — for example, by dropping the saw, while holding the rear handle, so that the bar tip hits a rigid, wooden surface.

c) Then adjust the chain tension adjuster to its mid-position and move the guide bar to its uppermost position, at the top of the bar, in order to eliminate the play, and fasten the guide bar on the saw.

The saw chain shall not be installed and the tanks shall be empty.

d) Attach the accelerometer(s) so as to measure the horizontal and vertical accelerations, a_x and a_y, respectively. The centrelines of the active direction of the accelerometer shall intersect the guide bar tip radius centre point within ± 2 mm. For the other two orthogonal directions, the centre of gravity of the respective accelerometers shall be within ± 10 mm from the guide bar tip radius centre point. The orientation of the accelerometer(s) shall be as shown in Figure 2.

e) Mount the chain-saw on the test rig by the cord at attachment points A and B (see Figure 2), so that the longitudinal centreline for the guide bar is inclined downwards at 30° ± 2° and is parallel to the longitudinal plane of the test rig rocker.

Attachment point A shall be on the grip area of the rear handle.

Attachment point B shall be laterally adjusted so that the guide bar plane is vertical within ± 3°. Attachment point B shall be chosen high enough to ensure stable suspension of the chain-saw, i.e. the straight line between point A and B shall pass above the centre of gravity of the chain-saw, and shall be along the longitudinal centre plane of the guide bar chosen so that the guide bar tip will be lifted off the aluminium spacer when a normal force F_n of 2 N ± 0,4 N is applied (see Figure 2).

f) Adjust the angular support so that the line perpendicular to the test rig rocker longitudinal centreline through the contact point between the rocker spacer and the guide bar tip will pass through the guide bar tip radius centre point within ± 1 mm. The pulley shall be longitudinal positioned so that the guide bar tip will be pulled off the angular support when a tangential force F_t of 2 N ± 0,4 N is applied (see Figure 2).

Dimensions in millimetres

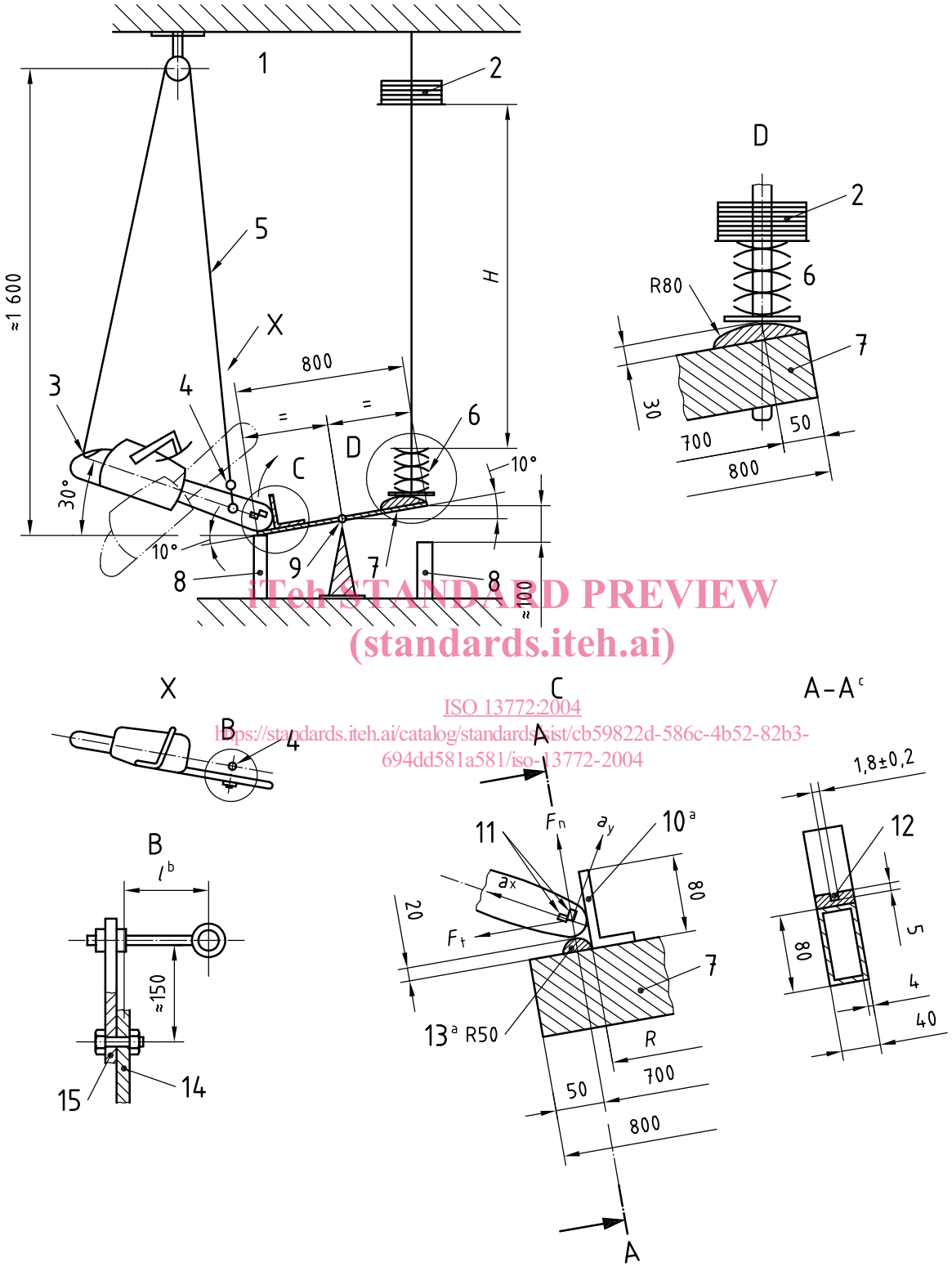


Figure 2 — Test rig with mounted chain-saw

Key

H drop height
F_n normal force
F_t tangential force
1 pivoting pulley adjustable in longitudinal and lateral direction
2 drop mass
3 adjustment point A
4 adjustment point B
5 cord
6 spring
7 rocker
8 shock absorber
9 ball bearing
10 adjustable angular support
11 accelerometer
12 notch
13 aluminium spacer
14 guide bar
15 rigid arm fixed to guide bar

[a] The acceleration of the chain-saw shall not be induced over the teeth of the sprocket into the guide bar. This can be avoided by a notch in the spacer and the angular support or by removing the sprocket (see detail A-A).

[b] Adjustable distance, l, for attachment point B is to coincide with the vertical plane through the centre of gravity of the chain-saw.

[c] Chain-saw omitted for clarity.

Figure 2 — Test rig with mounted chain-saw *(continued)*

8 Test procedure

Actuate the non-manually actuated chain brake using the acceleration that occurs after releasing the drop mass.

Preferably, start at a drop height of 200 mm and increase the height in steps of 100 mm to initiate actuation. After the first actuation, decrease the drop height again in steps of 20 mm to a point where the brake no longer actuates automatically.

Raise the drop height by 10 mm and repeat the test five times under the same conditions. If the brake is actuated five times, the conditions established shall be used to measure the accelerations a_x and a_y (see Figure 1).

If the brake is not actuated five times, raise the drop height by 10 mm and repeat the test five times. The procedure shall be repeated, if necessary, until the drop height at which the brake is actuated for all five tests is attained.

When the lowest drop height has been defined, measure and register the values of the tip accelerations, a_x and a_y, five times under the same conditions and calculate the average values of the accelerations.