



# Technical Specification

**ISO/TS 19858**

## Forestry machines — Portable chain-saws — Test method for evaluating saw chain lubricity

*Machines forestières — Tronçonneuses portables — Méthode  
d'essai pour l'évaluation de la capacité de lubrification de la  
chaîne de la scie*

**Second edition  
2024-01**

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CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents). ISO shall not be held responsible for identifying any or all such patent rights.

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 17, *Manually portable (hand-held) powered lawn and garden equipment and forest machinery*.

This second edition cancels and replaces the first edition (ISO/TS 19858:2015), which has been technically revised.

The main changes are as follows:

- specifying a sampling rate for temperature measurement;
- adaptation of the cutting set to products available on the market;
- adaptation of the measuring distance;
- correction of the standard for viscosity measurement;
- improvement of image quality.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

The test procedures given in this document create a reproducible replication of the stress conditions experienced by the saw chain and guide bar during sawing. The test shows the capacity of the lubricant for reducing the wear between friction partners.

This enables the manufacturers of chain-saws to include specifications for recommended saw chain lubricant in the owner's manual.

The test rig is based on a design produced by the Swedish test commission Svensk Maskinprovning (SMP). The test procedures also take into account the long-term practical experience of the Kuratorium für Waldarbeit und Forsttechnik e.V. (KWF) in testing bio-degradable chain lubricant.

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# Forestry machines — Portable chain-saws — Test method for evaluating saw chain lubricity

## 1 Scope

This document defines test procedures for classifying the lubrication ability of saw chain lubricant when using guide bar and saw chain.

## 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 2049, *Petroleum products — Determination of colour (ASTM scale)*

ISO 2909, *Petroleum products — Calculation of viscosity index from kinematic viscosity*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

### 3.1

#### **chain without teeth**

<saw>chain where the cutting links are replaced by links without teeth or bumpers

### 3.2

#### **loading wheel**

rubber coated wheel that applies the contact load to the chain from below

Note 1 to entry: See [Figure 1](#).

## 4 Test rig

### 4.1 General

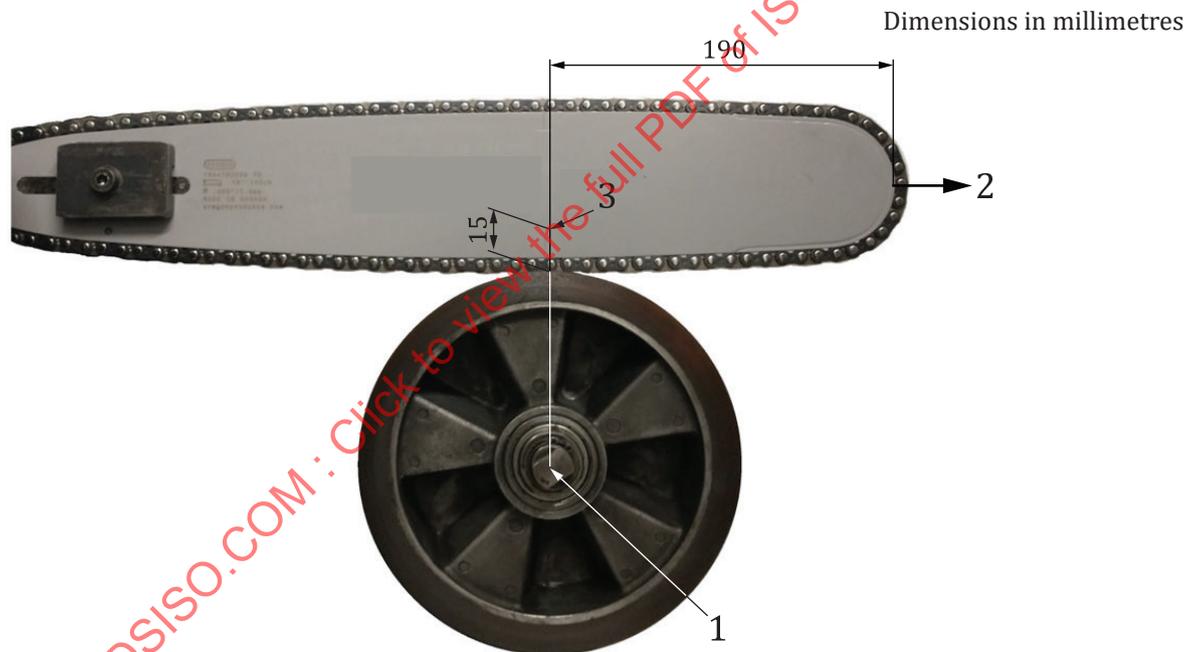
The test rig is designed so that the chain is driven by the rim sprocket. The chain speed is adjusted by controlling the output speed of the motor driving the sprocket. See [Figure 1](#).

### 4.2 Major components

The major components include the following:

- a) power source and a connecting device that transfers rotational energy to the cutting attachment;
- b) means of attachment for the cutting attachment;

- c) loading wheel with a diameter of  $(185 \pm 3)$  mm;
- d) oil pump with precision  $\pm 0,1$  ml/min;
- e) cutting attachment with the following specifications:
  - guide bar:
    - cutting length  $(400 \pm 10)$  mm;
    - pitch 9,525 mm / 0,375";
    - groove width 1,3 mm / 0,051";
    - bar nose radius  $32 \text{ mm} \pm 1 \text{ mm}$ .
  - chain:
    - 60 drive links;
    - pitch 9,525 mm / 0,375";
    - without teeth and bumper links.



**Key**

- 1 contact load
- 2 preload
- 3 measuring point temperature

**Figure 1 — Test rig with cutting attachment and loading wheel**

## 5 Test procedure

### 5.1 Ambient temperature

The ambient temperature shall be  $(20 \pm 5)$  °C during the run time period.

## 5.2 Test parameters

The test parameters are given in [Table 1](#).

**Table 1 — Test parameters**

	Run time [min]	Chain speed [m/s]	preload ( <i>PL</i> ) [N]	contact load ( <i>CL</i> ) [N]	Lubricant flow [ml/min]
Run-in period ( <a href="#">5.3</a> )	10	20	80 ± 5	50 ± 5	2 ± 0,2
Long duration ( <a href="#">5.4</a> )	180	20	80 ± 5	50 ± 5	2 ± 0,2

## 5.3 Chain elongation after the run-in period

Measure the chain elongation and wear of the guide bar after 10 min.

## 5.4 Chain elongation and wear of the guide bar after the long duration test

The wear of the guide bar and the elongation of the chain shall be measured after 180 min. The surface temperature of the guide bar shall be measured and recorded during the test. The sampling rate shall be a minimum of 6 per min.

The test shall be repeated with a new chain and new guide bar.

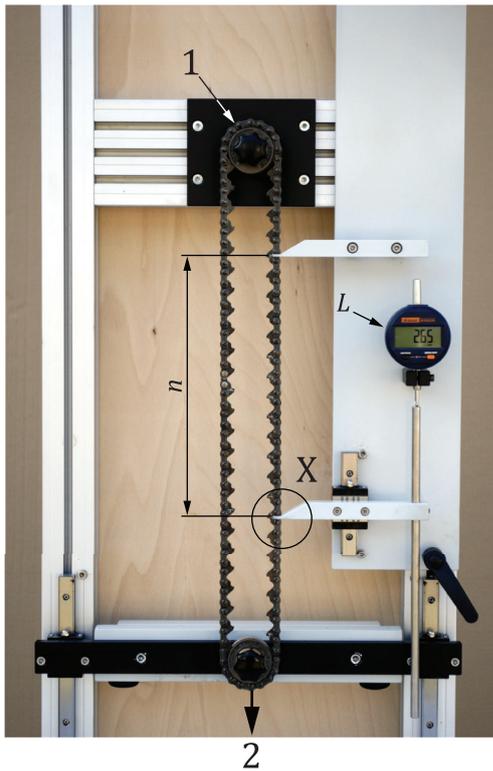
Before starting the tests and before measuring the guide bar wear and chain elongation, both guide bar and chain shall be cleaned with an ultra-sonic cleaner.

## 6 Measurements

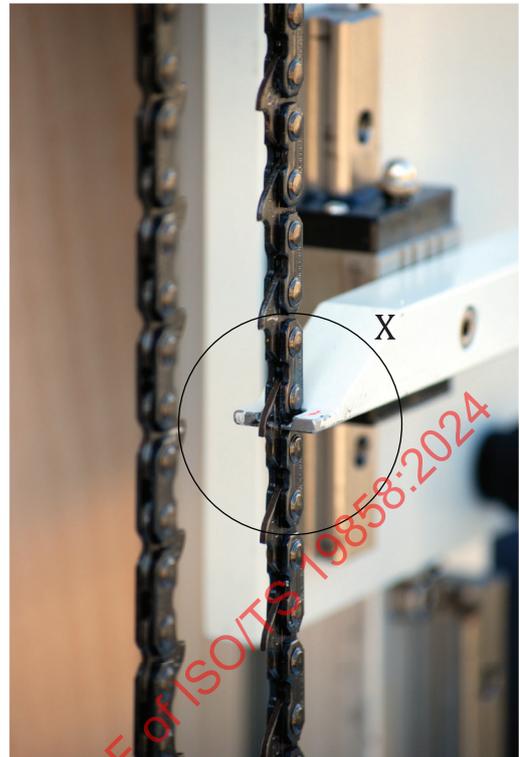
### 6.1 Chain elongation

To perform the measurement, the chain shall be mounted on two chain sprockets which are fastened to a fixed and a flexible mounting device [see [Figure 2](#) a)]. The chain shall be tensioned by applying a load *W* of (50 ± 2) N.

The calculation of the chain elongation shall be carried out based on the measurement of the defined distance on three separate sectors of the chain (*n*). The overall elongation of the chain shall then be calculated with the mean elongation determined on these three sectors. The minimum measuring distance each sector length is 26 rivets. The three sectors shall not intersect.



a) Equipment used for measuring chain elongation



b) Detailed view of the chain mounting, X

**Key**

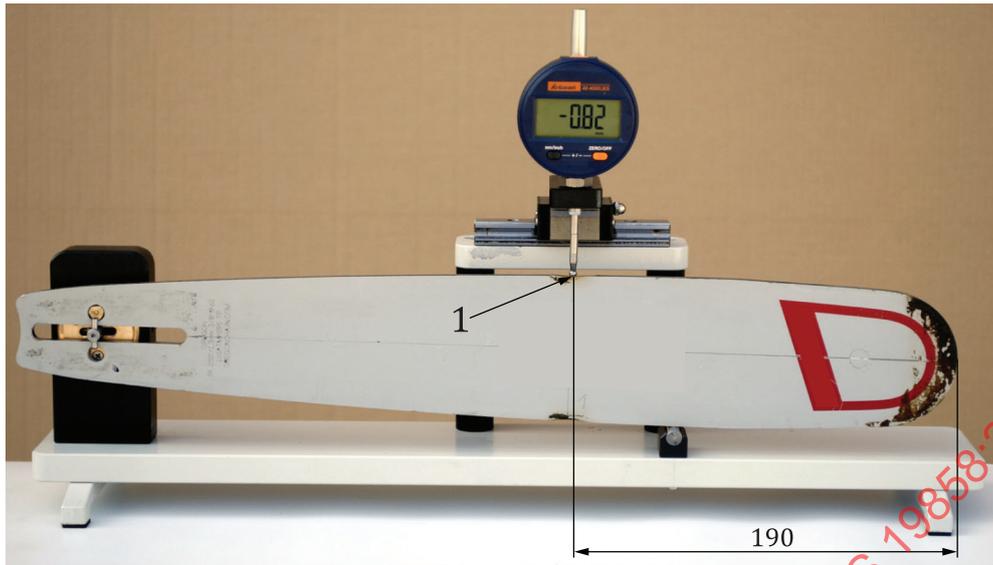
- 1 rim sprocket, 9 teeth
- 2 weight
- $n$  number of rivets
- $L$  length measuring device
- X chain mounting

**Figure 2 — Measuring chain elongation**

**6.2 Guide bar wear**

Abrasion of the guide bar shall be measured with a dial indicator with an accuracy of  $\pm 0,01$  mm [see [Figure 3 a\)](#)] and gauge slide with 4 mm ball. The wear is the depth of the material lost from the surface where the chain is pressed against the guide bar by the loading wheel [see [Figure 3 b\)](#)].

Lateral and vertical abrasion is measured with a ball head.



a) Equipment used for measuring guide bar wear



b) Ball head to measure the guide bar wear depth

**Key**

1 measuring point

**Figure 3 — Measuring guide bar wear**

**6.3 Temperature**

The temperature is measured at point (TM), using a thermometer with an accuracy of  $\pm 3$  °C.

**7 Information to be reported**

The test report shall contain at least the information provided in [Table 2](#) to [Table 5](#).