
**Machine tools — Environmental
evaluation of machine tools —**

**Part 2:
Methods for measuring energy
supplied to machine tools and
machine tool components**

*Machines-outils — Évaluation environnementale des machines-
outils —*

*Partie 2: Méthode pour mesurer l'énergie apportée aux machines-
outils et aux composants de machines-outils*

ISO 14955-2:2018

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Published in Switzerland

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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 documents 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).

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For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 39, *Machine tools*.

A list of all parts in the ISO 14955 series can be found on the ISO website.

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Introduction

As environmental impact is a common challenge for all products and as natural resources become scarce, environmental performance criteria for machine tools need to be defined and the use of these criteria needs to be specified.

Machine tools are complex systems used by industry to manufacture “ready for use” products or semi-finished workpieces. Their environmental impact includes wasted raw material, use of auxiliary substances such as lubricants and other material flows, as well as conversion of electrical energy into heat, dissipation of heat to the ambient or heat exchange by fluids and possibly the use of other resources such as compressed air. Based on relevance considerations, the ISO 14955 series is focussed on environmental impacts related to the energy supplied to the machine tool during the use stage.

The performance of a machine tool as key data for investment is multi-dimensional regarding its economic value, its technical specification and its operating requirements which are influenced by the specific application. The energy supplied to the same machine tool can vary depending on the part which is being manufactured and the conditions under which the machine tool is operated. Therefore, the environmental evaluation of a machine tool cannot be done regardless of these aspects.

ISO 14955-1 describes a methodology for the environmental evaluation of machine tools and gives reasons for measuring energy supplied to the machine tool.

ISO 14955-3 to ISO 14955-5 describe the application of ISO 14955-1 and ISO 14955-2 to specific groups of machine tools.

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Machine tools — Environmental evaluation of machine tools —

Part 2: Methods for measuring energy supplied to machine tools and machine tool components

1 Scope

This document describes how measurements are made by providing measuring methods in order to produce reproducible data about the energy supplied to a machine tool under specified conditions. Furthermore, it provides methods to quantify the energy supplied to components in order to assign their share to generalized machine tool functions as described in ISO 14955-1.

It supports the energy-saving design methodology according to ISO 14955-1 by providing measuring methods for the energy supplied to machine tools. The assignment of the energy supplied to machine tool functions requires measurements at machine tool component level. These measurements need to be reproducible and independent of conditions other than those being recorded and documented.

The results of the measurements are intended to document improvements to the design, specifically under energy aspects, and/or to allow evaluating the energy involved in the manufacturing of a given part by a given machine tool. Any comparison requires identical conditions and ensures by specification and measurement that similar results are achieved.

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 1217, *Displacement compressors — Acceptance tests*

ISO 8778, *Pneumatic fluid power — Standard reference atmosphere*

ISO 14955-1:2017, *Environmental evaluation of machine tools — Part 1: Design methodology for energy-efficient machine tools*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 14955-1 and the following apply.

ISO and IEC maintain terminological 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

average electrical power

average value of active electrical power for a given period in time

Note 1 to entry: Definitions for the measurement of electric power quantities under sinusoidal, non-sinusoidal, balanced, or unbalanced conditions are available in IEEE 1459-2010[13].