
**Welding and allied processes —
Guidelines for measurement of
welding energies**

*Soudage et techniques connexes — Lignes directrices pour le
mesurage des énergies de soudage*

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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.

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The committee responsible for this document is ISO/TC 44, *Welding and allied processes*, Subcommittee SC 10, *Unification of requirements in the field of metal welding*.

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Introduction

Welding “arc energy” or “heat input” are fundamental values used to manage the consistency of weld metal and heat-affected zone properties. ISO 15614 requires the measurement of the welding energies implemented during a welding procedure qualification, but it does not give details about the methods to be used. Likewise, during the construction of a welded assembly, inspectors should make sure that the welding energies comply with the Welding Procedure Specification (WPS). But again, the details of the methods to be used are not specified. As a consequence, there may be a lack of consistency between the methods used to measure the welding energies during welding of the test piece and the methods used during the manufacturing process. This is a potential source of error which could have implications on the safety or quality of a welded component or structure.

Moreover, the latest technological breakthroughs in microprocessors and electrical power manipulation have yielded welding power sources and control systems that are capable of generating complex waveforms. However, these control systems and waveforms increase the difficulties related to voltage and current intensity measurements, as their values are manipulated at frequencies which can reach thousands of Hertz. The measuring instruments generally used by inspectors, such as TRMS clamp meters, can no longer be relied on to correctly measure the welding energy since differences exceeding 30 % with respect to the true energy can sometimes be found.

This Technical Report provides guidance on how to accurately measure welding energy and calculate heat input, both in the case of traditional welding systems and those that employ complex waveforms.

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