International Standard

ISO 18491

Welding and allied processes — Measurement of arc energies

Soudage et techniques connexes — Mesure des énergies de l'arc

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Foreword

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This document was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 10, *Quality management in the field of welding*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 121, *Welding and allied processes,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This first edition of ISO 18491 cancels and replaces ISO/TR 18491:2015, which has been technically revised.

The main changes are as follows:

— update of normative references in Clause 2;

— update of terms used throughout this document;

— addition of precisions regarding the guidelines for voltage measurement in 7.2;

— addition of a new Annex B "Conversion factors";

— update of the Bibliography.

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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. The ISO 15614 series 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 conform with the Welding Procedure Specification (WPS); however, the details of the methods to be used are again not specified. Therefore, there can 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, modern technology 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 document provides guidance on how to accurately measure welding energy, both in the case of traditional welding systems and those that employ complex waveforms.