INTERNATIONAL STANDARD

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Acceptance tests for CO_2-laser beam machines for high quality welding and cutting —

Part 3: Calibration of instruments for measurement of gas flow and pressure

Essais de réception des machines de soudage et de coupage de qualité par faisceau laser CO_2 —

Partie 3: Étalonnage des instruments de mesure de débit et de pression des gaz d'assistance

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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 part of ISO 15616 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 15616-3 was prepared by the European Committee for Standardization (CEN) in collaboration with Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 10, *Unification of requirements in the fielsd of metal welding*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Throughout the text of this document, read "...this European Standard..." to mean "...this International Standard...".

ISO 15616 consists of the following parts, under the general title *Acceptance tests for CO_2-laser beam machines for high quality welding and cutting*:

— *Part 1: General principles, acceptance conditions*

— *Part 2: Measurement of static and dynamic accuracy*

— *Part 3: Calibration of instruments for measurement of gas flow and pressure*

Contents

Foreword

This document (EN ISO 15616-3:2003) has been prepared by Technical Committee CEN/TC 121, "Welding", the secretariat of which is held by DS, in collaboration with ISO/TC 44 "Welding and allied processes".

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2003, and conflicting national standards shall be withdrawn at the latest by September 2003.

This European Standard "*Acceptance test for CO_2 – laser beam machines for high quality welding and cutting*" consists of the following parts:

— *Part 1: General principles, acceptance conditions*

— *Part 2: Measurement of static and dynamic accuracy*

— *Part 3: Calibration of instruments for measurement of gas flow and pressure*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This Part of this European Standard is applicable to the measurement of the process oriented gas parameters for the acceptance tests for CO_2-laser beam machines for high quality welding and cutting in two operation directions (2D) in accordance with EN ISO 15616-1.

This standard specifies examination procedures for instruments used for control of process oriented gas parameters.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN ISO 15616-1:2003, *Acceptance tests for CO_2-laser beam machines for high quality welding and cutting — Part 1: General principles, acceptance conditions (ISO 15616-1:2003).*

3 Purpose of the measurements

During laser processing, gases and gas mixtures are used as working gases for joining procedures (welding) or as cutting gases for separating procedures (cutting).

To achieve reproducible processing results the working gas has to be supplied with a well-defined and long term stable pressure and gas flow to the point-of-use. The purpose of the measurements is to check the readings of the machine instruments.

4 Gas pressure and gas flow

The gas pressure is divided in two pressure ranges of < 1 MPa (< 10 bar) and > 1 MPa (> 10 bar). The gas flow is specified in litres per minute [l/min].

5 Examination procedure

5.1 General

The limit deviations are specified in EN ISO 15616-1:2003, Table 2.

Testing shall be carried out using the process in the absence of the laser beam and work piece (i.e. no welding or cutting takes place).

5.2 Measuring devices and procedure

5.2.1 General

The measuring devices used shall be suitable for the testing with respect to the measuring range and the maximum value and required accuracy.

All components being used, e.g. connecting fittings, hoses and data pickups shall be suitable for the gas in question at the pressure used.

The limit error of the measuring devices shall be at least ± 2 % of their maximum scale reading. The equipment shall be checked for leaks after set up.

The test equipment and the supply system shall be purged before testing alternative gases. The fume extraction system shall be switched on during testing.

5.2.2 Testing of the gas pressure

The accuracy of the gas pressure gauges shall be selected according to the test requirements.

The gauge instrument range should be 10/16 (measuring range/maximum scale reading) for pressures up to 10 bar and 20/40 for pressures up to 20 bar. To avoid errors of measurement, the pick-ups should be as close as possible to the pick-up for the machine instrument. If other gas pressure gauges are used the requirements according to 5.2.1 shall be respected.

Measurements shall be carried out with flowing gas stream: the flow rate or pressure shall be specified for each type of gas. The first reading shall be taken after 2 s and shall be recorded for 1 min continuously. Measurements shall cover the intended working range of the CO_2-laser beam machine.

5.2.3 Testing of the gas flow

The gas flow gauges shall be selected according to the test requirements. If the selected gauge requires simultaneous pressure measurements (gas flow gauge with float element) these should be placed close to the gas flow gauge.

The manufacturer's corrective factors shall be used to evaluate the results obtained. The first value should be read after 2 s and should be recorded for 1 min continuously. Measurements shall cover the intended working range of the CO_2-laser beam machine.

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