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**Specifikation för och kvalificering av svetsprocedurer för metalliska material – Svetsprocedurkontroll –
Del 14: Laser-båghybridsvetsning av stål, nickel och nickellegeringar (ISO 15614-14:2013)**

**Specification and qualification of welding procedures for metallic materials – Welding procedure test –
Part 14: Laser-arc hybrid welding of steels, nickel and nickel alloys (ISO 15614-14:2013)**

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Europastandarden EN ISO 15614-14:2013 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN ISO 15614-14:2013.

The European Standard EN ISO 15614-14:2013 has the status of a Swedish Standard. This document contains the official version of EN ISO 15614-14:2013.

Förhållandet till övriga delar under samma huvudtitel - Utdrag ur Förord i ISO 15614-14:2013/ Relations to other parts under the same general title - Extract from the Foreword of ISO 15614-14:2013

ISO 15614 consists of the following parts, under the general title Specification and qualification of welding procedures for metallic materials — Welding procedure test:
- Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys
- Part 2: Arc welding of aluminium and its alloys
- Part 3: Fusion welding of non-alloyed and low-alloyed cast irons
- Part 4: Finishing welding of aluminium castings
- Part 5: Arc welding of titanium, zirconium and their alloys
- Part 6: Arc and gas welding of copper and its alloys
- Part 7: Overlay welding
- Part 8: Welding of tubes to tube-plate joints
- Part 10: Hyperbaric dry welding:
- Part 11: Electron and laser beam welding
- Part 12: Spot, seam and projection welding
- Part 13: Upset (resistance butt) and flash welding
- Part 14: Laser-arc hybrid welding of steels, nickel and nickel alloys

Requests for official interpretations of any aspect of this part of ISO 15614 should be directed to the Secretariat of ISO/TC 44/SC 10 via your national standards body. A complete listing of these bodies can be found at www.iso.org.

Upplysningar om sakinnehållet i standarden lämnas av SIS, Swedish Standards Institute, telefon 08-555 520 00. Standarder kan beställas hos SIS Förlag AB som även lämnar allmänna upplysningar om svensk och utländsk standard.

Information about the content of the standard is available from the Swedish Standards Institute (SIS), telephone +46 8 555 520 00. Standards may be ordered from SIS Förlag AB, who can also provide general information about Swedish and foreign standards.

Denna standard är framtagen av kommittén för Laserbearbetning, SIS/TK 134/AGS 451.

Har du synpunkter på innehållet i den här standarden, vill du delta i ett kommande revideringsarbete eller vara med och ta fram andra standarder inom området? Gå in på www.sis.se - där hittar du mer information.

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 15614-14

June 2013

ICS 25.160.10

English Version

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 14: Laser-arc hybrid welding of steels, nickel and nickel alloys (ISO 15614-14:2013)

Descriptif et qualification d'un mode opératoire de soudage pour les matériaux métalliques - Épreuve de qualification d'un mode opératoire de soudage - Partie 14: Soudage hybride laser-arc des aciers, du nickel et des alliages de nickel (ISO 15614-14:2013)

Anforderung und Qualifizierung von Schweißverfahren für metallische Werkstoffe - Schweißverfahrensprüfung - Teil 14: Laserstrahl-Lichtbogen-Hybridschweißen von Stählen, Nickel und dessen Legierungen (ISO 15614-14:2013)

This European Standard was approved by CEN on 14 March 2013.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN ISO 15614-14:2013: E

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Foreword

This document (EN ISO 15614-14:2013) has been prepared by Technical Committee ISO/TC 44 "Welding and allied processes" in collaboration with Technical Committee CEN/TC 121 “Welding and allied processes” the secretariat of which is held by DIN.

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 December 2013, and conflicting national standards shall be withdrawn at the latest by December 2013.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 15614-14:2013 has been approved by CEN as EN ISO 15614-14:2013 without any modification.

Introduction

It is intended that all new welding procedure tests be carried out in accordance with this part of ISO 15614 from the date of its issue.

However, this part of ISO 15614 does not invalidate previous welding procedure tests made to former national standards or specifications.

Also, where additional tests shall be carried out to make the qualification technically equivalent, it is only necessary to do the additional tests on a test piece made in accordance with this part of ISO 15614.

Specification and qualification of welding procedures for metallic materials — Welding procedure test —

Part 14: Laser-arc hybrid welding of steels, nickel and nickel alloys

1 Scope

This part of ISO 15614 specifies how a preliminary welding procedure specification is qualified by welding procedure tests.

This part of ISO 15614 defines the conditions for the execution of welding procedure tests and the range of qualification for welding procedures for all practical welding operations within the range of variables listed in Clause 8.

NOTE 1 It is possible that additional tests are required by applications standards.

NOTE 2 The various parts of ISO 15614 comprise, in their turn, a series of International Standards on welding, details of which are given in ISO 15607:2003, Annex A.

2 Normative references

The following referenced documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3452-1, *Non-destructive testing — Penetrant testing — Part 1: General principles*

ISO 4136, *Destructive tests on welds in metallic materials — Transverse tensile test*

ISO 5173, *Destructive tests on welds in metallic materials — Bend tests*

ISO 6947, *Welding and allied processes — Welding positions*

ISO 9016, *Destructive tests on welds in metallic materials — Impact tests — Test specimen location, notch orientation and examination*

ISO 12932, *Welding — Laser-arc hybrid welding of steels, nickel and nickel alloys — Quality levels for imperfections*

ISO 14732, *Welding personnel — Qualification testing of welding operators and weld setters for mechanized and automatic welding of metallic materials*

ISO 15607:2003, *Specification and qualification of welding procedures for metallic materials — General rules*

ISO/TR 15608, *Welding — Guidelines for a metallic materials grouping system*

ISO 15609-6, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 6: Laser-arc hybrid welding*

ISO 15613, *Specification and qualification of welding procedures for metallic materials — Qualification based on pre-production welding test*

ISO 17636 (all parts), *Non-destructive testing of welds — Radiographic testing*

ISO 17637, *Non-destructive testing of welds — Visual testing of fusion-welded joints*

ISO 17638, *Non-destructive testing of welds — Magnetic particle testing*

ISO 17639, *Destructive tests on welds in metallic materials — Macroscopic and microscopic examination of welds*

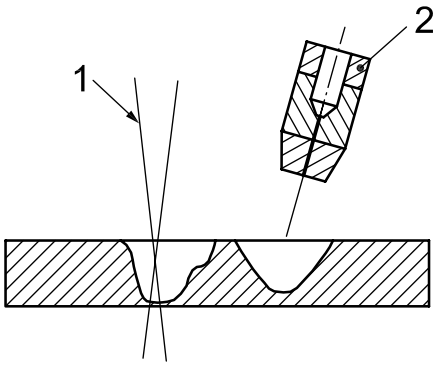
ISO 17640, *Non-destructive testing of welds — Ultrasonic testing — Techniques, testing levels, and assessment*

3 Terms and definitions

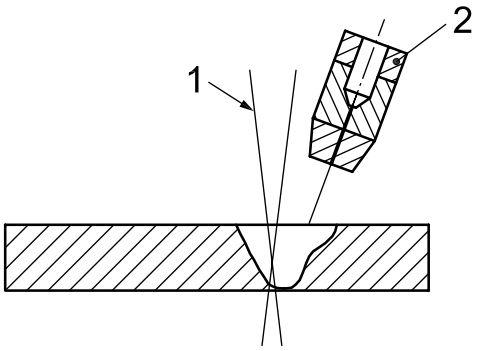
For the purposes of this document, the terms and definitions given in ISO 15607 and the following apply.

3.1
hybrid welding
welding in which two or more welding processes are used simultaneously in the same weld pool

Note 1 to entry: Hybrid welding is different than combinations of processes where at least two melt pools exist which are completely separated by a solid component in the solidification phases. Examples of a combined process (a) and a laser-arc hybrid welding process (b) are given in Figure 1 by using a laser beam and the additional energy source of an arc.



a) Combined process



b) Hybrid process

Key
1 laser beam
2 torch

Figure 1 — Combination of welding processes

4 Preliminary welding procedure specification

The preliminary welding procedure specification (pWPS) shall be prepared in accordance with ISO 15609-6.

5 Welding procedure test

The welding and testing of test pieces shall be in accordance with Clauses 6 and 7.

The welding operator who undertakes the welding procedure test satisfactorily in accordance with this part of ISO 15614 shall be qualified for the appropriate range of qualification in accordance with ISO 14732 provided the relevant testing requirements are met.

6 Test piece

6.1 General

The welded joint to which the welding procedure relates in production shall be represented by making a standardized test piece or pieces, as specified in 6.2. Where the production joint geometry requirements do not represent the standardized test piece as shown in this part of ISO 15614, the use of ISO 15613 shall be required.

The length or number of test pieces shall be sufficient to allow all required tests to be carried out.

Additional test pieces, or longer test pieces than the minimum size, can be prepared in order to allow for extra or for re-testing specimens (see 7.6). Application standards can require larger test pieces.

If required by the application standard, the direction of plate rolling shall be marked on the test piece when impact tests are required to be taken in the heat-affected zone (HAZ).

The plate thickness or pipe outside diameter and wall thickness of the test pieces shall be selected in accordance with 8.3.2.1 to 8.3.2.3.

6.2 Shape and dimensions of test pieces

6.2.1 Butt joint in plate

The test piece shall be prepared in accordance with Figure 2.

It may be used for fully and partially penetrated butt welds.

6.2.2 Butt joint in pipe

The test piece shall be prepared in accordance with Figure 3.

It may be used for fully and partially penetrated butt welds.

NOTE The word “pipe”, alone or in combination, is used to mean “pipe”, “tube” or “hollow section”.

6.2.3 T-joint

The test piece shall be prepared in accordance with Figure 4.

It may be used for fully and partially penetrated butt welds or fillet welds.

6.2.4 Corner joint

The test piece shall be prepared in accordance with Figure 5.

It may be used for fully and partially penetrated butt welds or fillet welds.