



**NSAI**  
Standards

Irish Standard  
I.S. EN ISO 15609-6:2013

# Specification and qualification of welding procedures for metallic materials - Welding procedure specification - Part 6: Laser-arc hybrid welding (ISO 15609-6:2013)

## I.S. EN ISO 15609-6:2013

*Incorporating amendments/corrigenda/National Annexes issued since publication:*

The National Standards Authority of Ireland (NSAI) produces the following categories of formal documents:

I.S. xxx: Irish Standard – national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation - recommendation based on the consensus of an expert panel and subject to public consultation.

SWIFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

*This document replaces:*

*This document is based on:*  
EN ISO 15609-6:2013

*Published:*  
12 April, 2013

This document was published  
under the authority of the NSAI  
and comes into effect on:  
12 April, 2013

**ICS number:**  
25.160.10

**NSAI**  
1 Swift Square,  
Northwood, Santry  
Dublin 9

T +353 1 807 3800  
F +353 1 807 3838  
E standards@nsai.ie  
W NSAI.ie

**Sales:**  
T +353 1 857 6730  
F +353 1 857 6729  
W standards.ie

Údarás um Chaighdeáin Náisiúnta na hÉireann

ICS 25.160.10

English Version

**Specification and qualification of welding procedures for metallic materials - Welding procedure specification - Part 6: Laser-arc hybrid welding (ISO 15609-6:2013)**

Descriptif et qualification d'un mode opératoire de soudage pour les matériaux métalliques - Descriptif d'un mode opératoire de soudage - Partie 6: Soudage hybride laser-arc (ISO 15609-6:2013)

Anforderung und Qualifizierung von Schweißverfahren für metallische Werkstoffe - Schweißanweisung - Teil 6: Laserstrahl-Lichtbogen-Hybridschweißen (ISO 15609-6:2013)

This European Standard was approved by CEN on 5 February 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.

CEN members are the national standards bodies of 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 United Kingdom.



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

**Management Centre: Avenue Marnix 17, B-1000 Brussels**

## **Contents**

Page

<b>Foreword.....</b>	<b>3</b>
----------------------	----------

## **Foreword**

This document (EN ISO 15609-6:2013) has been prepared by Technical Committee ISO/TC 44 "Welding and allied processes" in collaboration with Technical Committee CEN/TC 121 "Welding" 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 September 2013, and conflicting national standards shall be withdrawn at the latest by September 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 15609-6:2013 has been approved by CEN as EN ISO 15609-6:2013 without any modification.

*This page is intentionally left BLANK.*

**I.S. EN ISO 15609-6:2013**  
**INTERNATIONAL**  
**STANDARD**

**ISO**  
**15609-6**

First edition  
2013-04-01

---

---

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

**Part 6:  
Laser-arc hybrid welding**

*Descriptif et qualification d'un mode opératoire de soudage pour les  
matériaux métalliques — Descriptif d'un mode opératoire de soudage —  
Partie 6: Soudage hybride laser-arc*



Reference number  
ISO 15609-6:2013(E)

© ISO 2013



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2013

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

Published in Switzerland



# Contents

Page

<b>Foreword</b> .....	<b>iv</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
<b>4 Technical contents of welding procedure specification (WPS)</b> .....	<b>3</b>
4.1 General.....	3
4.2 Related to the manufacturer .....	3
4.3 Related to the parent materials .....	3
4.4 Welding process.....	3
4.5 Joint design.....	3
4.6 Welding position.....	4
4.7 Joint preparation .....	4
4.8 Welding technique .....	4
4.9 Fixtures, jigs and tooling .....	4
4.10 Backing .....	4
4.11 Filler material.....	4
4.12 Equipment used .....	5
4.13 Welding parameters .....	5
4.14 Thermal conditions.....	7
4.15 Operations between runs and after welding.....	7
<b>Annex A (informative) Example of welding procedure specification for laser-arc hybrid welding</b> ...	<b>8</b>

## 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 2.

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

ISO 15609-6 was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 10, *Unification of requirements in the field of metal welding*.

ISO 15609 consists of the following parts, under the general title *Specification and qualification of welding procedures for metallic materials — Welding procedure specification*:

- *Part 1: Arc welding*
- *Part 2: Gas welding*
- *Part 3: Electron beam welding*
- *Part 4: Laser beam welding and cladding*
- *Part 5: Resistance welding*
- *Part 6: Laser-arc hybrid welding*

Requests for official interpretations of any aspect of this part of ISO 15609 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](http://www.iso.org).

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

## Part 6: Laser-arc hybrid welding

### 1 Scope

This part of ISO 15609 specifies requirements for the content of welding procedure specifications for laser-arc hybrid welding processes.

Variables listed in this part of ISO 15609 are those influencing the quality and the properties of the welded joint.

NOTE Details of ISO 15609 (all parts) are given in ISO 15607:2003, Annex A.

### 2 Normative references

The following 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 4063:2009, *Welding and allied processes — Nomenclature of processes and reference numbers*

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

ISO 11145, *Optics and photonics — Lasers and laser-related equipment — Vocabulary and symbols*

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

ISO/TR 25901:2007, *Welding and related processes — Vocabulary*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 11145, ISO 15607 and ISO/TR 25901 and the following apply.

#### 3.1

##### **hybrid welding**

two or more fusion welding processes which interact in a single melt 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) a combined process and b) a laser-arc hybrid welding process are given in [Figure 1](#) by the use of a laser beam and the additional energy source of an arc.

This is a free preview. Purchase the entire publication at the link below:

[Product Page](#)

- 
- Looking for additional Standards? Visit Intertek Inform Infostore
  - Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation
-