



## English Version

**Resistance welding - Weldability - Part 1: General requirements  
for the evaluation of weldability for resistance spot, seam and  
projection welding of metallic materials (ISO 18278-1:2015)**

Soudage par résistance - Soudabilité - Partie 1: Exigences  
générales pour l'évaluation de la soudabilité pour le  
soudage par résistance par points, à la molette et par  
bossages des matériaux métalliques (ISO 18278-1:2015)

Widerstandsschweißen - Schweißgunung - Teil 1:  
Bewerten der Schweißgunung zum Widerstandspunkt-,  
Rollennaht- und Buckelschweißen von metallischen  
Werkstoffen (ISO 18278-1:2015)

This European Standard was approved by CEN on 17 January 2015.

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

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

Contents	Page
Foreword.....	3

## **Foreword**

This document (EN ISO 18278-1:2015) 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of an identical text or by endorsement, at the latest by October 2015, and conflicting national standards shall be withdrawn at the latest by October 2015.

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.

This document supersedes EN ISO 18278-1:2004.

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 18278-1:2015 has been approved by CEN as EN ISO 18278-1:2015 without any modification.

---

---

**Resistance welding — Weldability —  
Part 1:  
General requirements for the  
evaluation of weldability for  
resistance spot, seam and projection  
welding of metallic materials**

*Soudage par résistance — Soudabilité —*

*Partie 1: Exigences générales pour l'évaluation de la soudabilité pour  
le soudage par résistance par points, à la molette et par bossages des  
matériaux métalliques*





**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2015

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>2</b>
<b>4 Weldability</b>	<b>3</b>
4.1 Weldability of a component	3
4.1.1 General	3
4.1.2 Metallurgical weldability	3
4.1.3 Operative weldability	3
4.1.4 Constructional weldability	3
4.2 Criteria for the evaluation of weldability	3
<b>5 Preparation of welding equipment</b>	<b>4</b>
5.1 Welding machine	4
5.2 Welding electrodes	4
5.2.1 General	4
5.2.2 Spot welding	4
5.2.3 Seam welding	4
5.2.4 Projection welding	5
5.3 Measurement of parameters	5
5.3.1 Welding current	5
5.3.2 Electrode force	5
<b>6 Test procedures</b>	<b>5</b>
6.1 General	5
6.2 Basic test procedures	5
6.2.1 Essential variables	5
6.2.2 Welding current range test	6
6.2.3 Electrode life test	6
6.3 Evaluation of weld properties	7
6.3.1 General	7
6.3.2 Shop floor tests	7
6.3.3 Tensile shear testing	7
6.3.4 Mechanized peel testing	7
6.3.5 Cross tension testing	7
6.3.6 Macro-sections and hardness test	8
6.3.7 Further weld properties	8
<b>7 Test report</b>	<b>8</b>
7.1 General	8
7.2 Welding current range test	8
7.3 Electrode life test	8
<b>Annex A (informative) How to evaluate the mass and friction of the welding head</b>	<b>10</b>
<b>Bibliography</b>	<b>11</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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: [Foreword — Supplementary Information](#).

The committee responsible for this document is ISO/TC 44, *Welding and allied processes*, Subcommittee SC 6, *Resistance welding and allied mechanical joining*.

This second edition cancels and replaces the first edition (ISO 18278-1:2004), which has been technically revised.

ISO 18278 consists of the following parts, under the general title *Resistance welding — Weldability*:

- *Part 1: General requirements for the evaluation of weldability for resistance spot, seam and projection welding of metallic materials*
- *Part 2: Evaluation procedures for weldability in spot welding*



# Resistance welding — Weldability —

## Part 1:

## General requirements for the evaluation of weldability for resistance spot, seam and projection welding of metallic materials

### 1 Scope

This part of ISO 18278 specifies procedures for assessing the generic weldability for resistance welding of uncoated and coated metals.

It is assumed for this and other linked standards that their application is entrusted to appropriately trained, skilled, and experienced personnel.

For the quality of welded structures, the relevant part of ISO 14554 is applicable. The specification of procedures is to follow guidelines as in ISO 15609-5.

The purpose of the tests are to

- a) compare the metallurgical weldability of different metals,
- b) assess the weldability of differing component designs, e.g. dimensional configuration, stack-up, projection geometry, etc.,
- c) investigate the effect of changes in welding parameters such as welding current, weld time, electrode force or complex welding schedules including pulse welding, current stepping etc. on weldability, and/or
- d) compare the performance of resistance welding equipment.

Precise details of the test procedure to be used will depend on which aspect of items a) to d) will be evaluated relative to the welding result obtained.

### 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 669, *Resistance welding — Resistance welding equipment — Mechanical and electrical requirements*

ISO 693, *Dimensions of seam welding wheel blanks*

ISO 5182, *Resistance welding — Materials for electrodes and ancillary equipment*

ISO 5821, *Resistance welding — Spot welding electrode caps*

ISO 8167, *Projections for resistance welding*

ISO 10447, *Resistance welding — Peel and chisel testing of resistance spot and projection welds*

ISO 14270, *Resistance welding — Destructive testing of welds — Specimen dimensions and procedure for mechanized peel testing resistance spot, seam and embossed projection welds*

ISO 14271, *Resistance welding — Vickers hardness testing (low-force and microhardness) of resistance spot, projection, and seam welds*

ISO 14272, *Resistance welding — Destructive testing of welds — Specimen dimensions and procedure for cross tension testing of resistance spot and embossed projection welds*

ISO 14273, *Resistance welding — Destructive testing of welds — Specimen dimensions and procedure for tensile shear testing resistance spot, seam and embossed projection welds*

ISO 14323, *Resistance welding — Destructive testing of welds — Specimen dimensions and procedure for impact tensile shear test and cross-tension testing of resistance spot and embossed projection welds*

ISO 14324, *Resistance spot welding — Destructive tests of welds — Method for the fatigue testing of spot welded joints*

ISO 15609-5, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 5: Resistance welding*

ISO 15614-12, *Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 12: Spot, seam and projection welding*

ISO 15614-13, *Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 13: Upset (resistance butt) and flash welding*

ISO 16432, *Resistance welding — Procedure for projection welding of uncoated and coated low carbon steels using embossed projection(s)*

ISO 17653, *Resistance welding — Destructive tests on welds in metallic materials — Torsion test of resistance spot welds*

ISO 17654, *Resistance welding — Destructive tests of welds — Pressure test of resistance seam welds*

ISO 17657-2, *Resistance welding — Welding current measurement for resistance welding — Part 2: Welding current meter with current sensing coil*

ISO 17677-1, *Resistance welding — Vocabulary — Part 1: Spot, projection and seam welding*

ISO 18592, *Resistance welding — Destructive testing of welds — Method for the fatigue testing of multi-spot-welded specimens*

ISO/TR 581:2005, *Weldability — Metallic materials — General principles*

**koniec náhľadu – text ďalej pokračuje v platenej verzii STN**