



SWEDISH
STANDARDS
INSTITUTE

SVENSK STANDARD SS-EN ISO 17657-4:2007

Fastställd 2007-06-28

Utgåva 1

Motståndssvetsning – Mätning av svetsström – Del 4: Kalibreringssystem (ISO 17657-4:2005)

Resistance welding – Welding current measurement for resistance welding – Part 4: Calibration system (ISO 17657-4:2005)

ICS 25.160.10

Språk: engelska

Publicerad: augusti 2007

Europastandarden EN ISO 17657-4:2007 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN ISO 17657-4:2007.

The European Standard EN ISO 17657-4:2007 has the status of a Swedish Standard. This document contains the official English version of EN ISO 17657-4:2007.

Upplýsingar 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 upplýsingar** om svensk och utländsk standard.

Postadress: SIS Förlag AB, 118 80 STOCKHOLM
Telefon: 08 - 555 523 10. *Telefax:* 08 - 555 523 11
E-post: sis.sales@sis.se. *Internet:* www.sis.se

EUROPEAN STANDARD

EN ISO 17657-4

NORME EUROPÉENNE

EUROPÄISCHE NORM

June 2007

ICS 25.160.10

English Version

Resistance welding - Welding current measurement for
resistance welding - Part 4: Calibration system (ISO 17657-
4:2005)

Soudage par résistance - Mesurage des courants en
soudage par résistance - Partie 4: Système d'étalonnage
(ISO 17657-4:2005)

Widerstandsschweißen - Schweißstrommessung für das
Widerstandsschweißen - Teil 4: Kalibriersystem (ISO
17657-4:2005)

This European Standard was approved by CEN on 19 May 2007.

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 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



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

Management Centre: rue de Stassart, 36 B-1050 Brussels

EN ISO 17657-4:2007 (E)

Contents	Page
Foreword.....	iii
Introduction	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions.....	1
4 Construction of calibration system	2
4.1 Reference welding current measuring system.....	2
4.2 Test set-up.....	2
4.3 Basic feature for calibration of welding current measuring system	2
4.4 Basic feature for calibration of current sensor	4
4.5 Basic feature for calibration of welding current meter without sensor	5
5 Physical environment and operating conditions	6
6 Calibration requirements	6
6.1 Reference welding current measuring system.....	6
6.2 Reference current sensor	6
6.3 Data acquisition device	7
6.4 Test stage and power sources	7
7 Test report	7
7.1 Test report for calibration of welding current measuring systems	7
7.2 Test report for calibration of current sensors	8
7.3 Test report for calibration of welding current meters without sensors	8
8 Test procedure	9
8.1 General.....	9
8.2 Calibration of welding current measuring system	9
8.3 Calibration of current sensor	10
8.4 Calibration of welding current meter without sensor	10
8.5 Special calibration cases	10
Annex A (informative) Measuring set-up	12
Annex B (informative) Items to be recorded or filed as reference documentation for calibration	17
Annex C (informative) Examples of the test report in accordance with this part of ISO 17657	19

Foreword

The text of ISO 17657-4:2005 has been prepared by Technical Committee ISO/TC 44 "Welding and allied processes" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 17657-4:2007 by 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 December 2007, and conflicting national standards shall be withdrawn at the latest by December 2007.

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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Endorsement notice

The text of ISO 17657-4:2005 has been approved by CEN as a EN ISO 17657-4:2007 without any modification.

EN ISO 17657-4:2007 (E)

Introduction

Requests for official interpretations of any aspect of this part of ISO 17657 should be directed to the Secretariat of ISO/TC 44/SC 6 via your national standards body. A complete listing of these bodies can be found at <http://www.iso.org>.

Resistance welding — Welding current measurement for resistance welding —

Part 4: Calibration system

1 Scope

This part of ISO 17657 specifies calibration systems and calibration procedures for welding current measuring systems, current sensors, welding current meters and monitoring devices with current sensor used for measuring welding current in resistance welding with alternating current of 50 Hz or 60 Hz, or with direct current.

The procedures are applicable for a current range between 0,5 kA and 25 kA.

2 Normative references

The following referenced documents are indispensable for the application of this document. 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 17657-2, *Resistance welding — Welding current measurement for resistance welding — Part 2: Welding current meter with current sensing coil*

ISO 17657-3:2005, *Resistance welding — Welding current measurement for resistance welding — Part 3: Current sensing coil*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 669 and the following apply.

3.1

test (current) sensor

current sensor to be calibrated

3.2

reference (current) sensor

current sensor calibrated in highly accurate condition, used for calibration of current sensors

3.3

test welding current meter

welding current meter to be calibrated

EN ISO 17657-4:2007 (E)

- 3.4 non-inductive shunt**
high precision and low value resistance with a very low inductive component
- 3.5 analog-to-digital converter ADC**
device to convert analog input signals into digital signals
- 3.6 data acquisition device**
instrument or device used to acquire analog data, which tracks changes in physical variables such as voltage, current and temperature
- 3.7 measuring accuracy of reference welding current measuring system**
sum of measuring accuracy values of each component calibrated by a certified reference equipment (e.g. reference sensor, integrator, ADC etc.)

4 Construction of calibration system

4.1 Reference welding current measuring system

Components of a reference welding current measuring system shall be calibrated by certified reference equipment in accordance with Clause 6. The reference welding current measuring system consists of a calibrated current sensor, a data acquisition system and a display unit or a recorder.

4.2 Test set-up

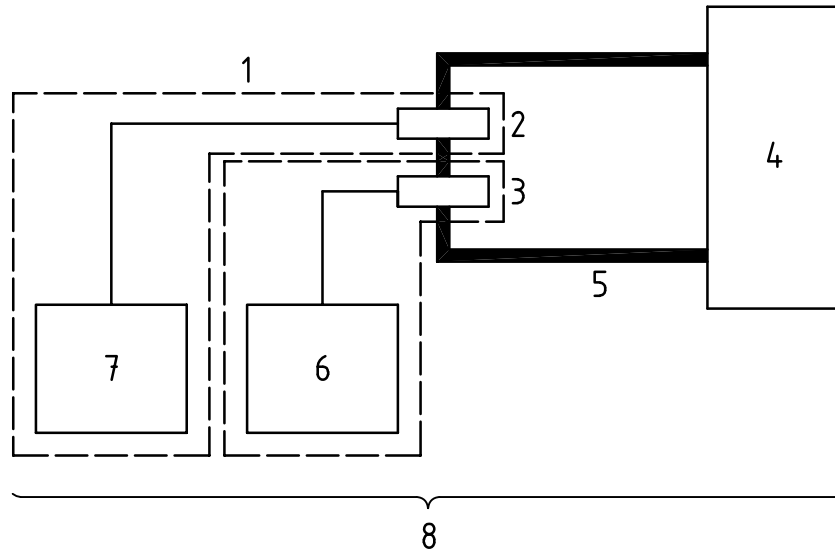
The test set-up consists of a test stage or an appropriate circuit for conducting high current, and a power source with a current control unit for supplying a test current.

All signal cables shall be twisted and shielded. The cable resistance shall be very small and negligible compared to the impedance of the current sensor. Typical examples of the test set-up are shown in Annex A.

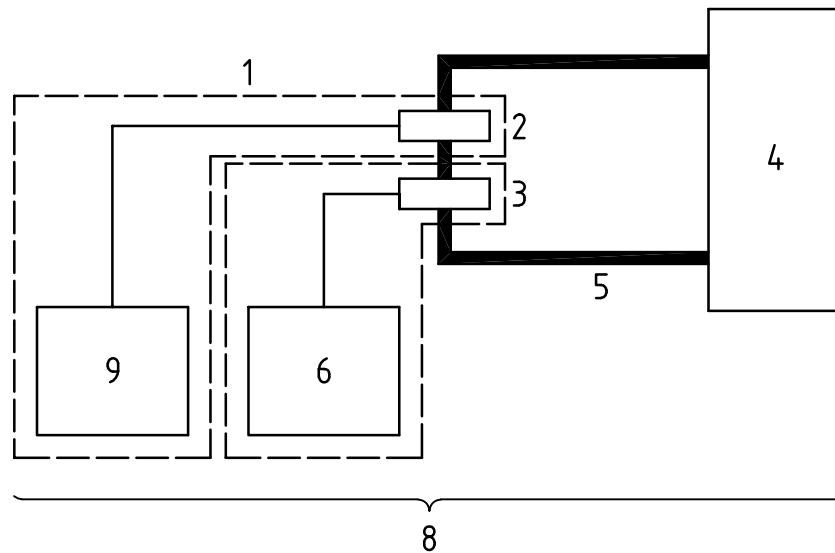
NOTE A resistance welding machine/transformer can be used as a test set-up.

4.3 Basic feature for calibration of welding current measuring system

A welding current meter with a current sensor should be calibrated in a set consisting of the meter and the sensor. Calibration systems for a welding current meter with its sensor consist of a test set-up, a reference welding current measuring system and the welding current measuring system to be tested. The function of a reference welding current meter can be replaced with a calibrated data acquisition device. Figure 1 shows the basic features required for calibration of welding current measuring system.



a)



b)

Key

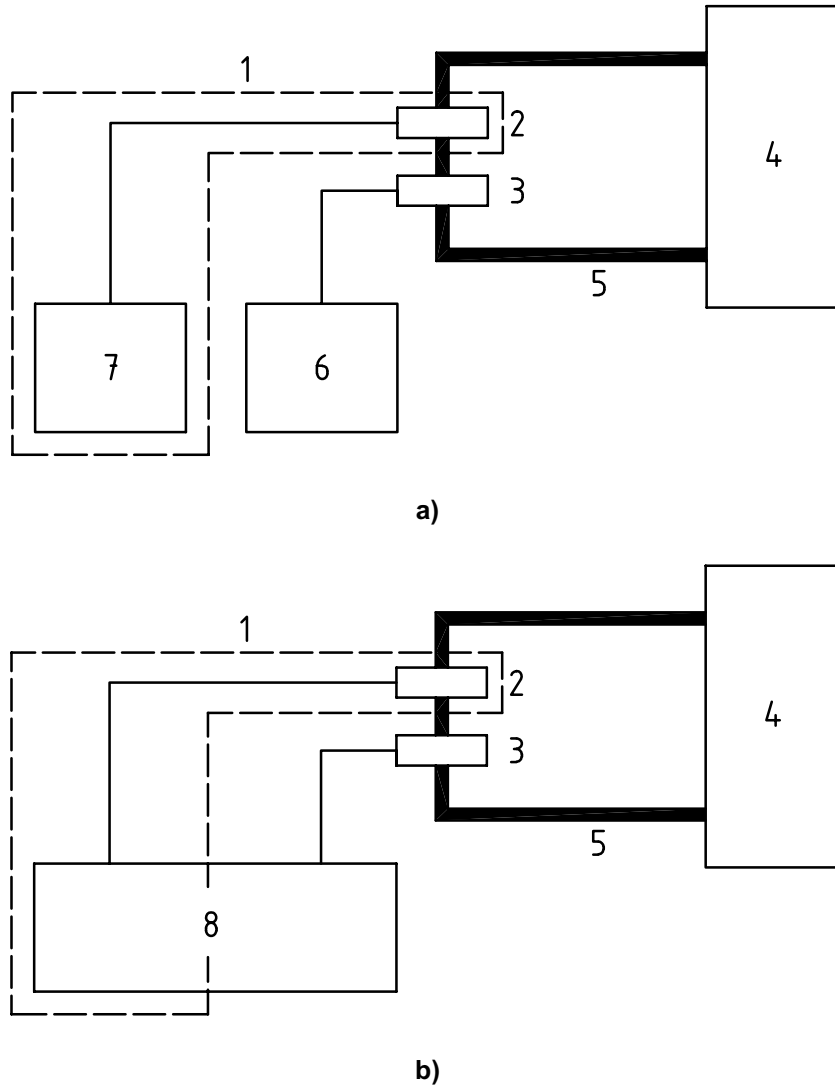
- | | |
|--|-----------------------------------|
| 1 reference welding current measuring system | 6 test welding current meter |
| 2 reference sensor | 7 reference welding current meter |
| 3 test sensor | 8 test set-up |
| 4 alternating current or direct current power source | 9 data acquisition device |
| 5 secondary circuit | |

Figure 1 — Basic feature for calibration of welding current measuring system

EN ISO 17657-4:2007 (E)

4.4 Basic feature for calibration of current sensor

A calibration system for a current sensor consists of a test set-up, a reference welding current measuring system and a calibrated data acquisition device connected to the current sensor to be tested. The function of the reference welding current meter can be replaced by using another channel of the data acquisition device. Figure 2 shows the basic feature required for the calibration of current sensor.



Key

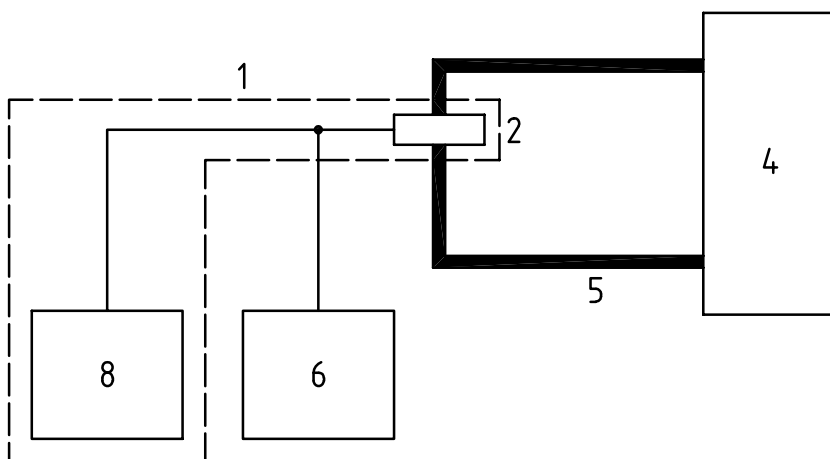
- | | | | |
|---|--|---|---------------------------------|
| 1 | reference welding current measuring system | 5 | secondary circuit |
| 2 | reference sensor | 6 | data acquisition device |
| 3 | test sensor | 7 | reference welding current meter |
| 4 | alternating current power source | 8 | data acquisition device |

Figure 2 — Basic feature for the calibration of current sensor

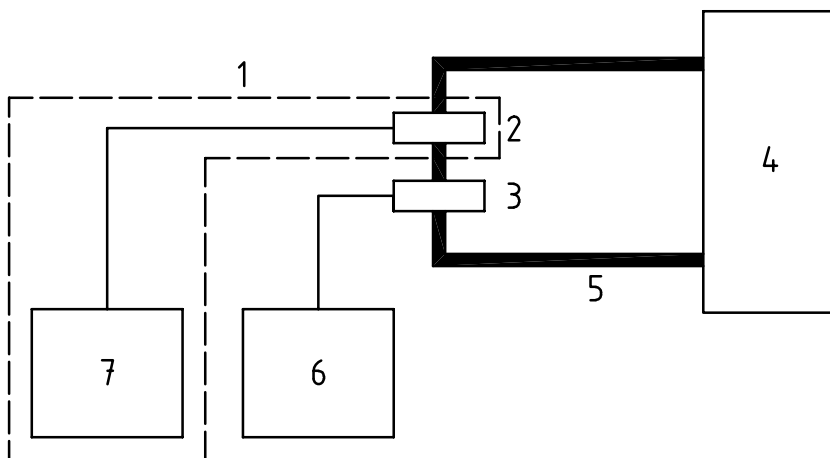
4.5 Basic feature for calibration of welding current meter without sensor

A calibration system for a welding current meter of the high-impedance integrator type without current sensor consists of a calibrated data acquisition device of the high-input-impedance integrator type, a calibrated reference sensor, and the test welding current meter. See Figure 3 a). The welding current meter to be tested is connected to the same output port of the reference current sensor. The data acquisition device shall not be replaced by a reference welding current meter of the low-impedance integrator type.

For calibration of a welding current meter with the low impedance integrator unit, and when two reference coils are used for the calibration, the calibration system shall consist of a calibrated reference welding current measuring system and a calibrated second reference sensor connected to the welding current meter to be tested. See Figure 3 b).



a)



b)

Key

- | | |
|--|-----------------------------------|
| 1 reference welding current measuring system | 5 secondary circuit |
| 2 reference sensor | 6 test welding current meter |
| 3 second reference sensor | 7 reference welding current meter |
| 4 alternating current or direct current power source | 8 data acquisition device |

Figure 3 — Basic feature for calibration of welding current meter without sensor