

SVENSK STANDARD

SS-EN ISO 15620:2019



Fastställt/Approved: 2019-07-04
Utgåva/Edition: 2
Språk/Language: engelska/English
ICS: 25.160;25.160.10

Svetsning – Friktionssvetsning av metalliska material (ISO 15620:2019)

Welding – Friction welding of metallic materials (ISO 15620:2019)



Standarder får världen att fungera

SIS (Swedish Standards Institute) är en fristående ideell förening med medlemmar från både privat och offentlig sektor. Vi är en del av det europeiska och globala nätverk som utarbetar internationella standarder. Standarder är dokumenterad kunskap utvecklad av framstående aktörer inom industri, näringsliv och samhälle och befrämjar handel över gränser, bidrar till att processer och produkter blir säkrare samt effektiviserar din verksamhet.

Delta och påverka

Som medlem i SIS har du möjlighet att påverka framtida standarder inom ditt område på nationell, europeisk och global nivå. Du får samtidigt tillgång till tidig information om utvecklingen inom din bransch.

Ta del av det färdiga arbetet

Vi erbjuder våra kunder allt som rör standarder och deras tillämpning. Hos oss kan du köpa alla publikationer du behöver – allt från enskilda standarder, tekniska rapporter och standardpaket till handböcker och onlinetjänster. Genom vår webbtjänst e-nav får du tillgång till ett lättnavigerat bibliotek där alla standarder som är aktuella för ditt företag finns tillgängliga. Standarder och handböcker är källor till kunskap. Vi säljer dem.

Utveckla din kompetens och lyckas bättre i ditt arbete

Hos SIS kan du gå öppna eller företagsinterna utbildningar kring innehåll och tillämpning av standarder. Genom vår närhet till den internationella utvecklingen och ISO får du rätt kunskap i rätt tid, direkt från källan. Med vår kunskap om standarders möjligheter hjälper vi våra kunder att skapa verklig nytta och lönsamhet i sina verksamheter.

Vill du veta mer om SIS eller hur standarder kan effektivisera din verksamhet är du välkommen in på www.sis.se eller ta kontakt med oss på tel 08-555 523 00.



Standards make the world go round

SIS (Swedish Standards Institute) is an independent non-profit organisation with members from both the private and public sectors. We are part of the European and global network that draws up international standards. Standards consist of documented knowledge developed by prominent actors within the industry, business world and society. They promote cross-border trade, they help to make processes and products safer and they streamline your organisation.

Take part and have influence

As a member of SIS you will have the possibility to participate in standardization activities on national, European and global level. The membership in SIS will give you the opportunity to influence future standards and gain access to early stage information about developments within your field.

Get to know the finished work

We offer our customers everything in connection with standards and their application. You can purchase all the publications you need from us - everything from individual standards, technical reports and standard packages through to manuals and online services. Our web service e-nav gives you access to an easy-to-navigate library where all standards that are relevant to your company are available. Standards and manuals are sources of knowledge. We sell them.

Increase understanding and improve perception

With SIS you can undergo either shared or in-house training in the content and application of standards. Thanks to our proximity to international development and ISO you receive the right knowledge at the right time, direct from the source. With our knowledge about the potential of standards, we assist our customers in creating tangible benefit and profitability in their organisations.

If you want to know more about SIS, or how standards can streamline your organisation, please visit www.sis.se or contact us on phone +46 (0)8-555 523 00



Europastandarden EN ISO 15620:2019 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN ISO 15620:2019.

Denna standard ersätter SS-EN ISO 15620, utgåva 1.

The European Standard EN ISO 15620:2019 has the status of a Swedish Standard. This document contains the official version of EN ISO 15620:2019.

This standard supersedes the SS-EN ISO 15620, edition 1.

© Copyright/Upphovsrätten till denna produkt tillhör SIS, Swedish Standards Institute, Stockholm, Sverige. Användningen av denna produkt regleras av slutanvändarlicensen som återfinns i denna produkt, se standardens sista sidor.

© Copyright SIS, Swedish Standards Institute, Stockholm, Sweden. All rights reserved. The use of this product is governed by the end-user licence for this product. You will find the licence in the end of this document.

Upplysningar om sakinnehållet i standarden lämnas av SIS, Swedish Standards Institute, telefon 08-555 520 00. Standarder kan beställas hos SIS 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, who can also provide general information about Swedish and foreign standards.

Denna standard är framtagen av kommittén för Svetsteknik, SIS/TK 134.

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

EN ISO 15620

NORME EUROPÉENNE

EUROPÄISCHE NORM

June 2019

ICS 25.160.10

Supersedes EN ISO 15620:2000

English Version

Welding - Friction welding of metallic materials (ISO 15620:2019)

Soudage - Soudage par friction des matériaux
métalliques (ISO 15620:2019)Schweißen - Reibschweißen von metallischen
Werkstoffen (ISO 15620:2019)

This European Standard was approved by CEN on 30 May 2019.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, 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: Rue de la Science 23, B-1040 Brussels**

Contents

Page

Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Welding knowledge	3
4.1 Process.....	3
4.1.1 General.....	3
4.1.2 Direct drive rotational friction welding.....	4
4.1.3 Stored energy (inertia) friction welding.....	6
4.1.4 Further processes.....	8
4.1.5 Friction welding arrangements.....	8
4.2 Materials and material combinations.....	8
4.3 Friction welding machines.....	9
4.3.1 General.....	9
4.3.2 Features.....	10
5 Quality requirements	10
5.1 General.....	10
5.2 Pre-welding requirements.....	10
5.2.1 Condition of raw materials.....	10
5.2.2 Preparation of the components to be welded.....	11
5.2.3 Component holding.....	11
5.3 Post-welding treatment.....	11
5.4 Quality assurance.....	11
6 Welding procedure specification (WPS)	12
6.1 General.....	12
6.2 Information related to the manufacturer.....	12
6.3 Information related to the material.....	13
6.4 Welding parameters.....	13
6.5 Joint.....	13
6.6 Optional devices.....	13
7 Welding procedure approval	13
7.1 Principles.....	13
7.2 Welding procedure tests.....	14
7.2.1 Application.....	14
7.2.2 Preliminary welding procedure specification (pWPS).....	14
7.2.3 Number of test weldments.....	14
7.2.4 Specification for test specimens.....	14
7.2.5 Test procedures.....	16
7.2.6 Acceptance criteria.....	18
7.3 Welding procedure approval record (WPQR).....	18
7.4 Previous experience.....	18
7.5 Circumstances mandating requalification.....	18
7.6 Machine-specific nature of a WPS.....	19
7.7 Requalification procedure requirements.....	19
8 Welding personnel	19
8.1 Friction welding machine operator.....	19
8.2 Friction welding machine setter.....	19
8.3 Welding coordination personnel (supervisor).....	19
Annex A (informative) Relationship of welding parameters	20

SS-EN ISO 15620:2019 (E)

Annex B (informative) Additional processes based on friction	22
Annex C (informative) Material combinations weldable by friction welding	25
Annex D (informative) Guidelines for quality assurance	27
Annex E (informative) Examination and test	28
Annex F (informative) Manufacturer's friction welding procedure specification (WPS)	30
Annex G (informative) Characteristics of friction welded components	32
Annex H (informative) Welding procedure approval record form (WPQR) Welding procedure approval — Test certificate	37
Bibliography	40

European foreword

This document (EN ISO 15620:2019) 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 2019, and conflicting national standards shall be withdrawn at the latest by December 2019.

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

This document supersedes EN ISO 15620:2000.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For the relationship with EU Directive(s) see informative Annex ZA, which is an integral part of this document.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 15620:2019 has been approved by CEN as EN ISO 15620:2019 without any modification.

SS-EN ISO 15620:2019 (E)**Introduction**

Friction welding is a method for making welds in the solid phase in which one component is moved relative to and in pressure contact with the mating component to produce heat at the faying surfaces, the weld being completed by the application of a force during or after the cessation of relative motion. There are several forms of supplying energy and various forms of relative movements.

The generation of friction heating results in a comparatively low joining temperature at the interface. This is largely the reason why friction welding is suitable for materials and material combinations which are otherwise difficult to weld. The weld region is generally narrow and normally has a refined microstructure.

While the friction welding process deals primarily with components of circular cross-section it does not preclude the joining of other component shapes.

Welding — Friction welding of metallic materials

1 Scope

This document specifies requirements for the friction welding of components manufactured from metals.

It specifies requirements particular to rotational friction welding related to welding knowledge, quality requirements, welding procedure specification, welding procedure approval and welding personnel.

This document is appropriate where a contract, an application standard or a regulatory requirement requires the demonstration of the manufacturer's capability to produce welded constructions of a specified quality. It has been prepared in a comprehensive manner to be used as a reference in contracts. The requirements given can be adopted in full or some can be deleted, if not relevant to the construction concerned.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological database for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

axial force

force in axial direction between components to be welded

3.2

burn-off length

loss of length during the friction phase

3.3

burn-off rate

rate of shortening of the *components* (3.4) during the friction welding process

3.4

component

single item before welding

3.5

component induced braking

reduction in *rotational speed* (3.18) resulting from friction between the interfaces

3.6

external braking

braking located externally reducing the *rotational speed* (3.18)