DRAFT INTERNATIONAL STANDARD

ISO/DIS 17660-2

ISO/TC **44**/SC **10** Secretariat: **DIN**

Voting begins on: **2017-08-28**

Voting terminates on: **2017-11-19**

Welding — Welding of reinforcing steel —

Part 2: Non load-bearing welded joints

Soudage — Soudage des aciers d'armatures —

Partie 2: Assemblages non transmettants

ICS: 25.160.10

This document is circulated as received from the committee secretariat.

ISO/CEN PARALLEL PROCESSING

Reference number
ISO/DIS 17660-2:2017(E)

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

Page

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).

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).

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 World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/TC 44/SC 10 "Quality management in the field of welding".

This second edition cancels and replaces the first edition (ISO 17660-2:2006), the clause 9 of which has been revised.

ISO 17660 consists of the following parts, under the general title *Welding — Welding of reinforcing steel*:

— *Part 1: Load-bearing welded joints*

— *Part 2: Non load-bearing welded joints*

Requests for official interpretations of any aspect of this part of ISO 17660 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.

Introduction

Reinforcing steel bars are produced by a number of process routes and usually have a ribbed profile. Taking these issues into account, it is apparent that both the welder and the welding coordinator require a specific level of skill and job knowledge and that special procedures for quality assurance need to be adopted.

Welding — Welding of reinforcing steel — Part 2: Non load-bearing welded joints

1 Scope

This part of ISO 17660 is applicable to the welding of weldable reinforcing steel and stainless reinforcing steel of non load-bearing welded joints, in workshops or on site. It specifies requirements for materials, design and execution of welded joints, welding personnel, quality requirements, examination and testing.

Load-bearing welded joints are covered by ISO 17660-1.

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 3834-4, *Quality requirements for fusion welding of metallic materials — Part 4: Elementary quality requirements*

ISO 4063, *Welding and allied processes — Nomenclature of processes and reference numbers*

ISO 5817, *Welding — Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) — Quality levels for imperfections*

ISO 14731, *Welding coordination — Tasks and responsibilities*

ISO 15609-1, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 1: Arc welding*

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

ISO 15614-1, *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*

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

ISO 15630-1, *Steel for the reinforcement and prestressing of concrete — Test methods — Part 1: Reinforcing bars, wire rod and wire*

ISO 16020, *Steel for the reinforcement and prestressing of concrete — Vocabulary*

EN 10079, *Definition of steel products*

EN 10080, *Steel for the reinforcement of concrete — Weldable reinforcing steel — General*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 10079, EN 10080 and ISO 16020 and the following apply.

3.1
load-bearing welded joint
welded joint used for transmission of specified loads between reinforcing steel bars, or between reinforcing steel bars and other steel products

3.2
non load-bearing welded joint
welded joint whose strength is not taken into account in the design of the reinforced concrete structure

NOTE The purpose of a non load-bearing welded joint is usually only to keep the reinforcing components in their correct places during fabrication, transport and concreting. The weld is often called tack weld.

3.3
manufacturer
enterprise carrying out the welding works within workshops or on site

4 Symbols and abbreviated terms

a	throat thickness
A_{gt}	percentage total elongation at maximum force
A_n	nominal cross-sectional area of the bar
d	nominal diameter of the welded bar
d_{max}	maximum nominal diameter of the welded bar
d_{min}	minimum nominal diameter of the welded bar
F_{max}	maximum tensile force
l	length of the weld (cross joint)
L_{min}	minimum length of the test specimen
r	radius of bent reinforcing steel bar
R_e	specified characteristic yield strength of the reinforcing steel bar
R_m	nominal tensile strength of the reinforcing steel bar
t	thickness of the web of a section or of a plate to be welded
CEV	carbon equivalent value
WPQR	welding procedure qualification record
WPS	welding procedure specification

5 Welding processes

The following welding processes in accordance with ISO 4063 may be used (see Table 1).

Table 1 — List of welding processes and reference numbers in accordance with ISO 4063

Welding process	English term	American term
111	manual metal arc welding (metal arc welding with covered electrode)	shielded metal arc welding
114	self-shielded tubular cored arc welding	
135	MAG welding with solid wire electrode	gas metal arc welding using active gas with solid wire electrode
136	MAG welding with flux cored electrode	gas metal arc welding using active gas and flux cored electrode
138	MAG welding with metal cored electrode	gas metal arc welding using active gas and metal cored electrode
21	resistance spot welding	upset welding
23	projection welding	

The principles of this part of ISO 17660 may be applied to other welding processes.

6 Non load-bearing welded joints

6.1 General

A summary of recommended diameters for non load-bearing welded joints, depending on the welding process, is given in Table 2.

Table 2 — Recommended range of bar diameters for non load-bearing welded joints

Welding process	Type of welded joint	Range of bar diameter for non load-bearing welded joints mm
21 23	lap joint	4 to 32
	cross joint [a]	6 to 50
111 114 135 136 138	lap joint	6 to 32
	cross joint [a]	6 to 50

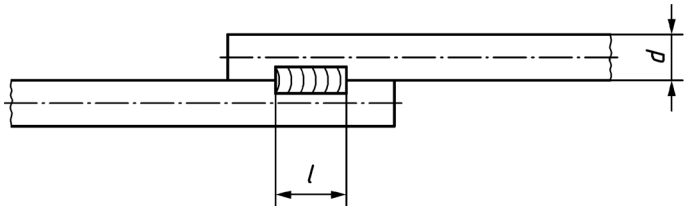
[a] d_{min}/d_{max} should be ≥ 0,4.

The welds shall not influence significantly the full load-bearing capacity and ductility of the bars, and the welding procedure may not cause embrittlement of the material.

NOTE The purpose of a non load-bearing welded joint is normally only to keep the reinforcing components in their correct places during fabrication, transport and concreting. These welds are often referred to as tack welds. The tack weldability of reinforcing steels can be demonstrated by special tack weldability tests (see CEN/TR 15481).

6.2 Type of joints

An example of a lap joint is given in Figure 1. Examples of a cross joint are given in Figures 2 and 3. The length of the weld l and throat thickness a depend on the application, and shall be in accordance with the WPS.



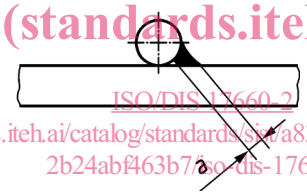
$l \geq 2d$

Key

l length of the weld

d nominal diameter of the welded bar

Figure 1 — Lap joint



Key

a throat thickness

Figure 2 — Cross joint

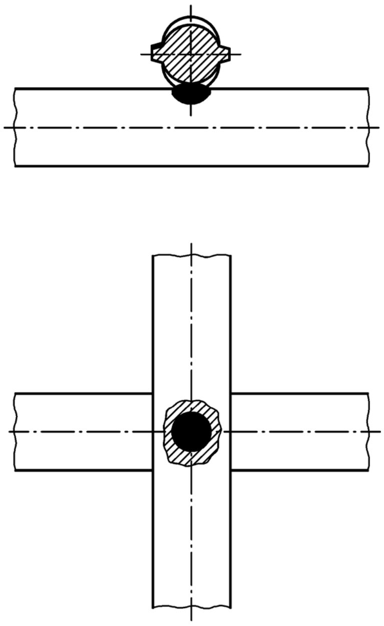


Figure 3 — Cross joint welded by welding processes 21 and 23

7 Materials

7.1 Parent materials

7.1.1 Reinforcing steels

Weldable reinforcing steel and stainless reinforcing steel, in accordance with the relevant standards or the technical specifications, may be used. For refurbishment and extensions of buildings, the weldability of the existing reinforcing steel shall be verified.

7.1.2 Inspection documents

An inspection certificate is required, unless the manufacturer of the reinforcing steel is certified to the relevant product standard for the market.

The carbon equivalent value (CEV), the manufacturing route and the delivery conditions shall be determined before welding.

This requirement for the CEV does not apply if:

a) the weldability is proven by a welding procedure test with a maximum CEV allowed in accordance with the relevant product standard, or

b) it can be proven that the steel delivered has an equal or lower CEV than the steel used in the welding procedure test.

For reinforcing and structural steels, the CEV shall be in accordance with the product standard, and shall be calculated in accordance with the following equation:

$$CEV = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Ni + Cu}{15} \quad (1)$$

