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**Varjenje - Varjenje betonskega jekla - 1. del: Obremenjeni zvarni spoji
(ISO/DIS 17660-1:2004)**

Welding - Welding of reinforcing steel - Part 1: Load bearing welded joints (ISO/DIS
17660-1:2004)

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Welding - Welding of reinforcing steel - Part 1: Load bearing welded joints (ISO/DIS 17660-1:2004)

Soudage - Soudage des aciers pour armature - Partie 1:
Assemblages transmettants les efforts (ISO/DIS 17660-
1:2004)

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

Foreword

This document (prEN ISO 17660-1:2004) has been prepared by Technical Committee CEN/TC 121 "Welding", the secretariat of which is held by DIN, in collaboration with Technical Committee ISO/TC 44 "Welding and allied processes".

This document is currently submitted to the third parallel Enquiry.

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Welding — Welding of reinforcing steel —

Part 1: Load bearing welded joints

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Foreword

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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 17660-1 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 17660 consists of the following parts, under the general title *Welding — Welding of reinforcing steel*:

- *Part 1: Load bearing welded joints (ISO/DIS 17660-1:2004)*
- *Part 2: Non-load bearing welded joints (ISO/DIS 17660-1:2004):*

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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, as well as the need for the adoption of special procedures for quality assurance.

Requests for official interpretations of any aspect of this International Standard should be directed to the Secretariat of ISO/TC 44/SC 10 via your national standards body, a complete listing which can be found at www.iso.org.

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Welding — Welding of reinforcing steel —

Part 1: Load bearing welded joints

1 Scope

This standard applies to the welding of weldable reinforcing steel and stainless reinforcing steel of load bearing joints in work shops or on site. It also covers welded joints between reinforcing steel bars and other steel components such as connection devices and insert anchors, including prefabricated assemblies. Non-load bearing joints are covered by ISO 17660-2.

This standard does not apply to factory production of welding fabric and lattice girders using multiple spot welding machines or multiple projection welding machines.

The requirements of this standard only apply for static loaded structures. This standard specifies requirements for materials, design and execution of welded joints, welding personnel, quality requirements, examination and testing.

NOTE For fatigue loaded structures depending on type of joint and welding process, some relevant reduction on the fatigue-strength of the reinforcing steel should be taken into account.

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.

EN 287-1:2004, *Qualification test of welders — Fusion welding — Part 1: Steels (ISO 9606-1, Qualification test of welders — Fusion welding — Part 1: Steels)*.

EN 10079, *Definition of steel products*.

prEN 10080-1, *Steel for the reinforcement of concrete — Weldable reinforcing steel — Part 1: General requirements*.

EN 10164, *Steel products with improved deformation properties perpendicular to the surface of the product — Technical delivery conditions*.

ISO 3834-3, *Quality requirements for welding — Fusion welding of metallic materials — Part 3: Standard 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 14732, *Welding personnel — Approval testing of welding operators for fusion welding and resistance weld setters for fully mechanized and automatic welding of metallic materials*.

ISO/DIS 17660-1.3

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

ISO 15609-2, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 2: Gas 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 15614-13, *Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 13: Resistance butt and flash-butt welding.*

ISO 15620, *Welding — Friction welding of metallic materials.*

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

ISO 15630-2, *Steel for the reinforcement and prestressing of concrete — Test methods — Part 2: Welded fabric.*

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

ISO/DIS 17660-2, *Welding — Welding of reinforcing steel — Non-load bearing welded joints.*

NOTE A list of European Standards (EN) conforming to these International Standards (ISO) is given in Annex ZA.

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3 Terms and definitions

For the purposes of this standard, the terms and definitions given in EN 10079, prEN 10080-1 and ISO/DIS 16020 and the following apply.

3.1 load bearing welded joints

used for transmission of specified loads between reinforcing steel bars and between reinforcing steel bars and other steel products

3.2 non-load bearing welded joints

welded joints of which the strength is not taken into account in the design of the reinforced concrete structure

NOTE The purpose of these joints is usually only to keep the reinforcing components in their correct places during fabrication, transport and concreting. These welds are often referred to as tack welds.

3.3 shear factor

S_f
relation between the shear force of a cross joint and the nominal yield strength (R_e) times the nominal cross section area (A_s) of the loaded bar

3.4 manufacturer

enterprise carrying out the welding works within workshops or on site

4 Symbols and abbreviated terms

A_n	nominal cross-sectional area of the bar
A_{gt}	Percentage total elongation at maximum force
A_s	nominal cross-sectional area of the bar to be anchored
a	throat thickness
d	nominal diameter of the welded bar
d_{max}	nominal diameter of the welded bar (biggest size)
d_{min}	nominal diameter of the welded bar (smallest size)
e	excess of the bar
F	force to be anchored by transverse bar
F_m	maximum tensile force
F_s	shear force
l	length of the weld (cross joint)
l_0	overall lap length
L	length of test specimen
R_e	specified characteristic yield strength of the reinforcing steel
R_m	nominal tensile strength of the reinforcing steel
S_f	shear factor
t	thickness of the web of a section or of a plate to be welded
w	weld width
x	root gap
y	depth of root face
α	included angle
BW	butt weld
CEV	carbon equivalent value
FW	fillet weld
SF	Shear factor class
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):