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## **Welding — Studs and ceramic ferrules for arc stud welding**

*Soudage — Goujons et bagues céramiques pour le soudage à l'arc des  
goujons*



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## 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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 13918 was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 10, *Unification of requirements in the field of metal welding*.

This second edition cancels and replaces the first edition (ISO 13918:1998), which has been technically revised.

## Introduction

The range of types of studs specified in this International Standard represents customary applications.

This International Standard can be used in all fields of the metal-working industry.

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# Welding — Studs and ceramic ferrules for arc stud welding

## 1 Scope

This International Standard specifies:

- requirements for studs and ceramic ferrules for arc stud welding;
- dimensions, materials, mechanical properties and, when required, conditions of evaluation of conformity.

Table 1 shows types of studs and the symbols for studs and ceramic ferrules that are covered by this document.

**Table 1 — Types of studs and symbols for studs and ceramic ferrules**

| Welding technique  | Type of stud <sup>a</sup>         | Symbol for studs | Symbol for ceramic ferrules |
|--|-----------------------------------|------------------|-----------------------------|
| Drawn arc stud welding with ceramic ferrule or shielding gas   | threaded stud (pitch)             | PD               | PF                          |
|  | threaded stud with reduced shaft  | RD               | RF                          |
|  | unthreaded stud                   | UD               | UF                          |
|  | stud with internal thread         | ID               | UF                          |
|  | shear connector                   | SD               | UF                          |
| Short-cycle drawn arc stud welding   | threaded stud with flange (pitch) | PS               | —                           |
|  | unthreaded stud                   | US               | —                           |
|  | stud with internal thread         | IS               | —                           |
| Stud welding with tip ignition   | threaded stud (pitch)             | PT               | —                           |
|  | unthreaded stud                   | UT               | —                           |
|  | stud with internal thread         | IT               | —                           |
| <sup>a</sup> Further types of stud and ceramic ferrules can be specified as required for special applications. |                                   |                  |                             |

## 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 898-1, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs*

ISO 3506-1, *Mechanical properties of corrosion-resistant stainless-steel fasteners — Part 1: Bolts, screws and studs*

ISO 4042, *Fasteners — Electroplated coatings*

ISO 4759-1, *Tolerances for fasteners — Part 1: Bolts, screws, studs and nuts — Product grades A, B and C*

ISO 4964, *Steel — Hardness conversions*

ISO 6892, *Metallic materials — Tensile testing at ambient temperature*

ISO 6947, *Welds — Working positions — Definitions of angles of slope and rotation*

ISO 14555, *Welding — Arc stud welding of metallic materials*

ISO/TR 15608, *Welding — Guidelines for a metallic materials grouping system*

EN 573-3, *Aluminium and aluminium alloys — Chemical composition and form of wrought products — Part 3: Chemical composition and form of products*

EN 1301-2, *Aluminium and aluminium alloys — Drawn wire — Part 2: Mechanical properties*

EN 10088-1, *Stainless steels — Part 1: List of stainless steels*

EN 12166, *Copper and copper alloys — Wire for general purposes*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 14555 and the following apply.

#### 3.1

##### **inspection lot**

arrangement of units of which a random sample is taken for testing and which requires the same chemical composition of the raw material, the same diameter of the finished product and the same manufacturing procedure during the stud production

#### 3.2

##### **manufacturing lot**

quantity of studs of a single designation including type of stud, size, property class and material, manufactured from bar, wire, rod or flat product from a single cast, processed through the same or similar steps at the same time or over a continuous time period through the same heat treatment and/or coating process, if any

NOTE Same heat treatment or coating process means:

- for a continuous process, the same treatment cycle without any setting modification;
- for a discontinuous process, the same treatment cycle for identical consecutive loads (batches).

The manufacturing lot can be split into a number of manufacturing batches for processing purposes and then reassembled into the same manufacturing lot.

[Adapted from ISO 15330:1999, definition 3.3]

### 4 Symbols and abbreviated terms

- $b$  length of the thread
- $c_d$  depth of the crack in the head
- $d_1$  nominal diameter
- $d_2$  diameter at the weld area
- $d_3$  diameter of the weld collar