INTERNATIONAL STANDARD

**ISO 4063**

Fifth edition
2023-03

# Welding, brazing, soldering and cutting — Nomenclature of processes and reference numbers

*Soudage, brasage et coupage — Nomenclature et numérotation des procédés*



Reference number
ISO 4063:2023(E)



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Published in Switzerland

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# Foreword

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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).

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This document was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 7, *Representation and terms*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 121, *Welding and allied processes*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fifth edition cancels and replaces the fourth edition (ISO 4063:2009), which has been technically revised.

The main changes are as follows:

— incorporation of processes and reference numbers for welding and thermal joining of plastics.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html. Official interpretations of ISO/TC 44 documents, where they exist, are available from this page: https://committee.iso.org/sites/tc44/home/interpretation.html.

# Welding, brazing, soldering and cutting — Nomenclature of processes and reference numbers

## 1 Scope

This document establishes a nomenclature for:

— welding;

— brazing, soldering and weld brazing;

— thermal cutting;

with each process identified by a reference number.

It covers the main processes (one digit), groups (two digits) and sub-groups (three digits). The reference number for any process has a maximum of three digits. This system is intended as an aid in computerization and the drafting of, for example, drawings, working papers and welding procedure specifications, and enables the uniform international designation of the processes.

This document does not cover all process variants. The process numbers can be supplemented with additional information for variants not listed.

## 2 Normative references

There are no normative references in this document.

## 3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

## 4 Designation

### 4.1 General

Where a full designation is required for a joining process, it shall have the following structure: the number of this document (i.e. “ISO 4063”), separated by a dash from the reference number of the process, as shown in these examples.

EXAMPLE 1 Process “Cold pressure welding” with reference number 48 is designated as:

ISO 4063 – 48

EXAMPLE 2 Process “Radio frequency welding” with reference number 62 is designated as:

ISO 4063 – 62

EXAMPLE 3 Process “Heated wedge welding with hot gas” with reference number 662-A is designated as:

ISO 4063 – 662-A

### 4.2 Hybrid joining processes

When multiple processes are used simultaneously in one process area, the processes shall be described using the designations for each process separated by the symbol "+".

EXAMPLE Process "Gas laser welding" (reference number 522) together with process "Plasma arc welding" (reference number 15) is designated as:

ISO 4063 – 522 + 15

## 5 List of processes and reference numbers

### 5.1 General

The first designation listed is the preferred one and any subsequent designations are synonyms. Terms used in the United States of America (USA) are shown for information where there are differences.

Annex A provides supplementary options for process variants.

Annex B provides an overview for replaced and obsolete processes.

Annex C provides a list of commonly used acronyms and abbreviations for the welding processes in the United States of America included in this document.

### 5.2 Welding

**1 Arc welding**

**11 Metal arc welding without gas protection**

111 Manual metal arc welding
Shielded metal arc welding, USA

112 Gravity welding
Gravity arc welding with covered electrode
Gravity feed welding, USA

114 Self-shielded tubular cored arc welding

**12 Submerged arc welding**

121 Submerged arc welding with solid wire electrode

122 Submerged arc welding with strip electrode

124 Submerged arc welding with metal powder addition

125 Submerged arc welding with tubular cored electrode

126 Submerged arc welding with cored strip electrode

**13 Gas-shielded metal arc welding**
**Metal inert gas (MIG) welding/Metal active gas (MAG) welding**
**Gas metal arc welding (GMAW), USA**

131 MIG welding with solid wire electrode
GMAW using inert gas and solid wire electrode, USA

132 MIG welding with flux cored electrode
Gas shielded flux cored arc welding, USA

133 MIG welding with metal cored electrode
GMAW using inert gas and metal cored wire, USA

135 MAG welding with solid wire electrode
GMAW using active gas with solid wire electrode, USA

136 MAG welding with flux cored electrode
GMAW using active gas and flux cored electrode, USA

138 MAG welding with metal cored electrode
GMAW using active gas and metal cored electrode, USA

**14 Gas-shielded arc welding with non-consumable tungsten electrode**
**Tungsten inert gas (TIG) welding/Tungsten active gas (TAG) welding**
**Gas tungsten arc welding (GTAW), USA**

141 TIG welding with solid filler material
GTAW using inert gas and solid filler material, USA

142 Autogenous TIG welding
Autogenous gas tungsten arc welding using inert gas, USA

143 TIG welding with tubular cored filler material
GTAW using inert gas and tubular cored filler material, USA

145 TIG welding using reducing gas and solid filler material
GTAW using inert gas plus reducing gas additions and solid filler material, USA

146 TIG welding using reducing gas and tubular cored filler material
GTAW using inert gas plus reducing gas additions and tubular cored filler material, USA

147 Gas-shielded arc welding with non-consumable tungsten electrode using active gas
TAG welding
GTAW using active gas, USA

**15 Plasma arc welding**

151 Plasma MIG welding

152 Powder plasma arc welding

153 Plasma welding with transferred arc

154 Plasma arc welding with non-transferred arc

155 Plasma arc welding with partially transferred arc

**18 Other arc welding processes**

185 Magnetically impelled arc welding

**2 Resistance welding**

**21 Resistance spot welding**

211 Indirect spot welding

212 Direct spot welding

**22 Resistance seam welding**

221 Lap seam welding

222 Mash seam welding

223 Prep-lap seam welding

224 Wire seam welding

225 Foil butt-seam welding

226 Seam welding with strip

**23 Projection welding**

231 Indirect projection welding

232 Direct projection welding

**24 Flash welding**

241 Flash welding with preheating

242 Flash welding without preheating

**25 Resistance butt welding**
**Upset welding, USA**

**26 Resistance stud welding**

**27 HF resistance welding**
**High-frequency resistance welding**
**High-frequency upset welding, USA**

**29 Other resistance welding processes**

**3 Gas welding**
**Oxyfuel gas welding, USA**

**31 Oxyfuel gas welding**

311 Oxyacetylene welding

312 Oxypropane welding

313 Oxyhydrogen welding

**4 Welding with pressure**

**41 Ultrasonic welding**

411 Ultrasonic hot welding

412 Ultrasonic spot welding

413 Ultrasonic seam welding

414 Ultrasonic torsion welding

**42 Friction welding**

421 Direct drive friction welding

422 Inertia friction welding

423 Friction stud welding

424 Linear friction welding (generally referred to as “vibration welding” when the base materials are plastics)

425 Radial friction welding

426 Orbital friction welding

**43 Friction stir welding**

431 Friction stir spot welding

432 Refill friction stir spot welding

433 Stitch friction stir spot welding

434 Swept friction stir spot welding

435 Swing friction stir spot welding

**44 Impact welding** (referred to as shock welding in ISO/TR 25901-3:2016, 2.2.1.6.10)

441 Explosion welding

442 Magnetic pulse welding

**45 Diffusion welding**

451 Hot isostatic pressure welding

**47 Oxyfuel gas pressure welding**
**Pressure gas welding, USA**

**48 Cold pressure welding**
**Cold welding, USA**

481 Cold pressure extrusion welding

**49 Hot pressure welding**

491 Hot nozzle welding

492 Nail head welding

493 Coextrusion welding

**5 Beam welding**

**51 Electron beam welding**

511 Electron beam welding in vacuum

512 Electron beam welding in atmosphere

513 Electron beam welding with addition of shielding gases

**52 Laser welding**
**Laser beam welding, USA**

521 Solid state laser welding

522 Gas laser welding

523 Diode laser welding
Semi-conductor laser welding, USA

**6 Plastics-specific welding processes**

**61 Resistive implant welding**

611 Electrofusion welding

**62 Radio frequency welding**
**High-frequency welding**
**Dielectric welding**

**63 Solvent welding**

631 Solvent cement welding

**64 Hot gas welding**

641 Hot gas speed welding

642 Hot gas round nozzle welding

643 Hot gas manual welding without welding rod

644 Hot gas machine welding without welding rod

645 Hot gas machine welding with welding rod

646 Hot gas convection welding

647 Extrusion welding

**65 Heat sealing**

651 Impulse welding

652 Hot bar welding

**66 Heated tool welding**

661 Hot plate welding

662 Heated wedge welding

663 Socket fusion welding

664 Saddle fusion welding

**67 Flash-free welding**

671 Flow fusion welding

**69 Other plastics-specific welding processes**

691 Microwave welding

692 Staking

**7 Other welding processes**

**71 Aluminothermic welding**
**Thermite welding, USA**

**72 Electroslag welding**

721 Electroslag welding with strip electrode

722 Electroslag welding with wire electrode

**73 Electrogas welding**

**74 Induction welding**

741 Induction butt welding
Induction upset welding, USA

742 Induction seam welding

743 High frequency induction welding

**75 Light radiation welding**

753 Infrared welding

**78 Arc stud welding**

783 Drawn arc stud welding with ceramic ferrule or shielding gas

784 Short-cycle drawn arc stud welding

785 Capacitor discharge drawn arc stud welding

786 Capacitor discharge stud welding with tip ignition

## 5.3 Thermal cutting

**8 Cutting and gouging**

**81 Flame cutting**
**Oxygen cutting**
**Oxyfuel cutting, USA**

**82 Arc cutting**

821 Air arc cutting
Air carbon arc cutting, USA

822 Oxygen arc cutting

**83 Plasma cutting**
**Plasma arc cutting, USA**

831 Plasma cutting with oxidising gas

832 Plasma cutting without oxidising gas

833 Air plasma cutting

834 High-tolerance plasma cutting

**84 Laser cutting**
**Laser beam cutting, USA**

**86 Flame gouging**
**Thermal gouging, USA**

**87 Arc gouging**

871 Air arc gouging
Air carbon arc cutting, USA

872 Oxygen arc gouging
Oxygen gouging, USA

**88 Plasma gouging**

## 5.4 Brazing and soldering

**9 Brazing and soldering**

**91 Brazing with local heating**

911 Infrared brazing

912 Flame brazing
Torch brazing, USA

913 Laser beam brazing

914 Electron beam brazing

916 Induction brazing

972 Arc weld brazing
Arc braze welding, USA

973 Gas metal arc weld brazing
Gas metal arc braze welding, USA

974 Gas tungsten arc weld brazing
Gas tungsten arc braze welding, USA

975 Plasma arc weld brazing
Plasma arc braze welding, USA

976 Laser weld brazing
Laser braze welding, USA

977 Electron beam weld brazing
Electron beam braze welding, USA

# Annex A
(informative)

# Process variants

## A.1 Transfer modes

For welding processes where different modes are possible, the mode can be indicated by a letter in accordance with Table A.1 and as shown in the example.

**Table A.1 — Transfer modes**

| Mode | Term |
|---|---|
| B | Buried-arc transfer |
| D | Short-circuit transfer (dip transfer) |
| G | Globular transfer |
| S | Spray transfer |
| P | Pulsed transfer[a] |
| [a] Referred to as "pulsed current" in ISO/TR 25901-4. | |

EXAMPLE MIG welding with solid wire electrode using short-circuit transfer is designated as:

ISO 4063 – 131-D

## A.2 Number of electrodes

If more than one electrode is used, it can be indicated by an additional number as shown in the example.

EXAMPLE MIG welding with two solid wire electrodes is designated as:

ISO 4063 – 131 – 2

## A.3 Additional items

If additional filler material is used, the option hot wire/cold wire can be indicated in accordance with Table A.2 and as shown in the example.

**Table A.2 — Additional items**

| Mode | Term |
|---|---|
| C | Cold wire |
| H | Hot wire |

EXAMPLE Submerged arc welding with a solid wire electrode and an additional cold wire is designated as:

ISO 4063 – 121-C

## A.4 Plastics joining

Additional process variants for plastics joining can be identified in accordance with Table A.3 and as shown in the example.

**Table A.3 — Additional processes**

| Term | Reference number |
|---|---|
| Transmission laser welding – contour | 52-A |
| Transmission laser welding – quasi-simultaneous | 52-B |
| Transmission laser welding – simultaneous | 52-C |
| Transmission laser welding – scan | 52-D |
| Transmission laser welding – mask | 52-E |
| Direct laser welding | 52-F |
| Vibration welding with IR pre-heat | 424-A |
| Heated wedge welding with hot gas | 662-A |
| Heated wedge welding (electric) | 662-B |

EXAMPLE Heated wedge welding with hot gas is designated as:

ISO 4063 – 662-A

## A.5 Staking

Staking process variants can be identified in accordance with Table A.4 and as shown in the example.

**Table A.4 — Staking processes**

| Term | Reference number |
|---|---|
| Electrical | E |
| Hot air | H |
| Infrared | I |
| Ultrasonic | U |

EXAMPLE Staking with hot air is designated as:

ISO 4063 – 692-H

# Annex B
(informative)

# Replaced and obsolete processes

Table B.1 presents a list of processes included in previous editions of this document which have been replaced or have become obsolete. They may be used retrospectively or in special cases but shall then be designated as shown in the last column.

**Table B.1 — Designation if replaced and obsolete processes**

| Former designation | Process | Designation to use |
|---|---|---|
| 113 | Bare wire metal arc welding<br>Bare metal arc welding, USA | ISO 4063:1990–113 |
| 115 | Coated wire metal arc welding | ISO 4063:1990–115 |
| 118 | Firecracker welding | ISO 4063:1990–118 |
| 137 | Tubular cored metal arc welding with inert gas shield<br>Flux cored arc welding, USA | ISO 4063:1990–137 |
| 149 | Atomic-hydrogen welding | ISO 4063:1990–149 |
| 181 | Carbon-arc welding | ISO 4063:1990–181 |
| **32** | **Air-fuel gas welding** | ISO 4063:1990–32 |
| 321 | Air-acetylene welding<br>Air acetylene welding, USA | ISO 4063:1990–321 |
| 322 | Air-propane welding | ISO 4063:1990–322 |
| **43** | **Forge welding** | ISO 4063:1990–43 |
| 752 | Arc image welding | ISO 4063:1990–752 |
| **77** | **Percussion welding** | ISO 4063:1990–77 |
| 781 | Arc stud welding | ISO 4063:1990–781 |
| 787 | Drawn arc stud welding with fusible collar | ISO 4063:1998–787 |
| 917 | Ultrasonic brazing | ISO 4063:1990–917 |
| 923 | Friction brazing | ISO 4063:1990–923 |
| 953 | Abrasion soldering | ISO 4063:1990–953 |

# Annex C
(informative)

# Acronyms for welding and allied processes used in the United States of America

Tables C.1 to C.4 present acronyms for welding and allied processes used in the United States of America.[1)] These are given together with corresponding reference numbers in this document, where such numbers exist. A dash signifies that no equivalent or corresponding reference number can be given.

**Table C.1 — Commonly used US acronyms for welding**

| US acronym | Corresponding reference number in this document |
|---|---|
| AAW | 321[b] |
| AHW | 149[b] |
| AW | 1 |
| BMAW | 113[b] |
| CAW-G | 181[b] |
| CAW-S | 181[b] |
| CAW-T | 181[b] |
| CEW | 493 |
| CW | 48 |
| DFW | 45 |
| EBW | 51 |
| EBW-HV | 511 |
| EBW-MV | 511 |
| EBW-NV | 512 |
| EGW | 73 |
| ESW | 72 |
| ESW-CG | 72[a] |
| EXW | 441 |
| FCAW | 114, 136 |
| FCAW-G | 136 |
| FCAW-S | 114 |
| FOW | 43[b] |
| FRW | 42 |
| FRW-DD | 421 |
| FRW-I | 422 |
| FSW | 43 |
| FW | 24 |

[a] Not exactly equivalent.

[b] See Annex B.

1) According to the American Welding Society (AWS).

**Table C.1** *(continued)*

| US acronym | Corresponding reference number in this document |
|---|---|
| GMAW | 13 |
| GMAW-P | 13-P |
| GMAW-S | 13-D |
| GTAW | 14 |
| GTAW-P | 14-P |
| HIPW | 451 |
| HPW | 49 |
| IW | 74 |
| LBW | 52 |
| MIAW | 185 |
| OAW | 311 |
| OFW | 31 |
| OHW | 313 |
| PAW | 15 |
| PEW | 77[b] |
| PGW | 47 |
| PW | 23 |
| ROW | 27[a] |
| RSEW | 22 |
| RSEW-HF | 22[a] |
| RSEW-I | 742 |
| RSEW-MS | 222 |
| RSW | 21 |
| RW | 2 |
| RW-PC | 2 |
| SAW | 12 |
| SAW-S | 12[a] |
| SMAW | 111 |
| SSW | 4 |
| SW | 783/785/786 |
| TW | 71 |
| USW | 41 |
| UW | 25 |
| UW-HF | 27[a] |
| UW-I | 741 |

[a] Not exactly equivalent.

[b] See Annex B.