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STANDARD

**ISO**  
**9956-2**

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**Specification and approval of welding  
procedures for metallic materials —**

**Part 2:**

Welding procedure specification for arc  
welding

*Descriptif et qualification d'un mode opératoire de soudage pour les  
matériaux métalliques —*

*Partie 2: Descriptif d'un mode opératoire de soudage pour le soudage à  
l'arc*



Reference number  
ISO 9956-2:1995(E)

## 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.

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.

International Standard ISO 9956-2 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 part of ISO 9956 is the equivalent of European Standard EN 288-2.

ISO 9956 consists of the following parts, under the general title *Specification and approval of welding procedures for metallic materials*:

- *Part 1: General rules for fusion welding*
- *Part 2: Welding procedure specification for arc welding*
- *Part 3: Welding procedure tests for the arc welding of steels*
- *Part 4: Welding procedure tests for the arc welding of aluminium and its alloys*
- *Part 5: Approval by using approved welding consumables for arc welding*
- *Part 6: Approval related to previous experience*
- *Part 7: Approval by a standard welding procedure for arc welding*
- *Part 8: Approval by a pre-production welding test*

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- *Part 10: Welding procedure specification for electron beam welding*
- *Part 11: Welding procedure specification for laser beam welding*
- *Part 12: Welding procedure test for arc welding of cast steels*

Annex A of this part of ISO 9956 is for information only.



# Specification and approval of welding procedures for metallic materials —

## Part 2:

## Welding procedure specification for arc welding

### 1 Scope

This part of ISO 9956 specifies requirements for the content of welding procedure specifications for arc welding processes. The principles of this part of ISO 9956 may be also applied to other fusion welding processes subject to agreement between the contracting parties.

Variables listed in this part of ISO 9956 are those influencing the metallurgy, mechanical properties and the geometry of the assembly.

### 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 9956. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 9956 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 4063:1990, *Welding, brazing, soldering and braze welding of metals — Nomenclature of processes and reference numbers for symbolic representation on drawings.*

ISO 6848:1984, *Tungsten electrodes for inert gas shielded arc welding, and for plasma cutting and welding — Codification.*

ISO 6947:1990, *Welds — Working positions — Definitions of angles of slope and rotation.*

ISO 9956-1:1995, *Specification and approval of welding procedures for metallic materials — Part 1: General rules for fusion welding.*

### 3 Definitions

For the purposes of this part of ISO 9956, the definitions given in ISO 9956-1 apply.

### 4 Technical contents of welding procedure specification (WPS)

#### 4.1 General

The welding procedure specification (WPS) shall give details of how a welding operation is to be performed and shall contain all relevant information about the welding work.

Welding procedure specifications may cover a certain range of thickness of the joined parts and may also cover a range of parent metals and even filler metals. Some manufacturers may prefer additionally to prepare work instructions for each specific job as part of detailed production planning.

Information listed in 4.2 to 4.5 is adequate for most welding procedures. For some applications it may be necessary to supplement or reduce the list. The relevant information shall be specified in the WPS.

Ranges and tolerances, according to the manufacturer's experience, shall be specified where appropriate.

An example of the WPS format is shown in annex A.

## 4.2 Related to the manufacturer

**4.2.1** Identification of the manufacturer.

**4.2.2** Identification of the WPS.

**4.2.3** Reference to the welding procedure approval record (WPAR) or other documents as required.

## 4.3 Related to the parent metal

**4.3.1** Parent metal type

— identification of material, preferably by reference to an appropriate standard.

NOTE 1 A WPS may cover a group of materials.

**4.3.2** Material dimensions

— the thickness ranges of the joint;

— outside diameter ranges for pipes.

## 4.4 Common to all welding procedures

**4.4.1** Welding process

— welding process(es) used shall be designated in accordance with ISO 4063.

**4.4.2** Joint design

— sketch of the joint design showing configuration and dimensions;

NOTE 2 Details may be given by reference to an appropriate standard on joint design.

— weld run sequence shall be given on the sketch if essential for the properties of the weld.

**4.4.3** Welding position

— applicable welding positions shall be specified in accordance with ISO 6947.

**4.4.4** Groove or edge preparation

— groove cleaning, degreasing, jiggling and tack welding;

— the methods to be used.

**4.4.5** Welding technique

— no weaving;

— weaving:

a) for manual welding, maximum width of the run,

b) for mechanized welding, maximum weaving or amplitude, frequency and dwell time of oscillation;

— torch, electrode and/or wire angle.

**4.4.6** Back gouging

— the method to be used.

**4.4.7** Backing

— the method and type of backing, material and dimensions;

— for gas backing, apply 4.5.3 to 4.5.5.

**4.4.8** Filler metal, designation

— classification, manufacturer and trade name.

**4.4.9** Filler metal, dimensions

— diameter of electrode/wire or width and thickness of strip electrode.

**4.4.10** Filler metal and flux, handling

— If a filler metal or flux is to be dried or treated before use, this shall be specified. Reference to an appropriate standard is permitted.

**4.4.11** Electrical parameters

— type of current (AC or DC) and polarity;

— pulse welding: pulse time, pulse current, pulse frequency, background current and background voltage to be specified;

- current range;
- arc voltage range.

#### 4.4.12 Mechanized welding

- travel speed range;
- wire feed speed range.

If the equipment does not permit control of one of the variables specified in 4.4.11 and 4.4.12, the machine settings shall be specified instead. The range of application for the WPS shall then be limited to equipment of that particular type.

#### 4.4.13 Preheat temperature

- if preheating is not required, the lowest permitted ambient temperature in workshop or on site.

#### 4.4.14 Interpass temperature

- maximum interpass temperature.

#### 4.4.15 Post-weld heat-treatment

- for any post-weld heat-treatment, or ageing, the procedure or reference to be made to a separate post-weld heat-treatment or ageing specification.

### 4.5 Specific to a group of welding processes

#### 4.5.1 Process group 11 (metal-arc welding without gas protection)

- for process 111, the run-out per unit length of electrode consumed.

#### 4.5.2 Process group 12 (submerged arc welding)

- for multiple electrode systems, the number and configuration of wire electrodes and electrical connections;

- stand-off distance: the distance from contact tip nozzle to the surface of the workpiece for mechanized welding;

- flux, designation: classification, manufacturer and trade name;

- additional filler metal.

#### 4.5.3 Process group 13 (gas-shielded metal arc welding)

- shielding gas and flowrate, nozzle diameter;

- number of wire electrodes;

- wire feed speed;

- additional filler metal;

- stand-off distance: the distance from contact tip nozzle to the surface of the workpiece for mechanized welding.

#### 4.5.4 Process group 14 (gas-shielded welding with non-consumable electrode)

- for tungsten electrode, the diameter, and codification in accordance with ISO 6848;

- shielding gas and flowrate, nozzle diameter.

#### 4.5.5 Process group 15 (plasma arc welding)

- plasma gas parameters, e.g. type, nozzle diameter, flowrate;

- shielding gas parameter, e.g. type, nozzle diameter, flowrate;

- type of torch;

- plasma current;

- stand-off distance.

## Annex A (informative)

### Manufacturer's welding procedure specification (WPS)

Location:  
 Manufacturer's welding procedure  
 Reference No.:  
 WPAR No.:

Examiner or test body:

Method of preparation and cleaning:  
 Parent material specification:

Manufacturer:  
 Welder's name:  
 Welding process:  
 Joint type:

Material thickness (mm):  
 Outside diameter (mm):  
 Welding position:

Weld preparation details (sketch)\*:

Joint design	Welding sequences

#### Welding details

Run	Process	Size of filler metal	Current A	Voltage V	Type of current/polarity	Wire feed speed	Travel speed*	Heat input*

Filler metal classification and trade name:

Any special baking or drying:

Gas flux:           shielding:  
                           backing:

Gas flow rate:    shielding:  
                           backing:

Tungsten electrode type/size:

Details of back gouging/backing:

Preheat temperature:

Interpass temperature:

Post-weld heat treatment and/or ageing:

Time, temperature, method:

Heating and cooling rates\*:

Manufacturer  
 Name, date and signature

Other information\*:

weaving (maximum width of run):

Oscillation: amplitude, frequency, dwell time:

Pulse welding details:

Stand-off distance:

Plasma welding details:

Torch angle:

Examiner or test body  
 Name, date and signature

\* If required







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**Descriptors:** welding, metals, fusion welding, arc welding, procedure, specifications, acceptance.

Price based on 4 pages

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