

INTERNATIONAL STANDARD

ISO 9956-5

First edition
1995-09-01

Specification and approval of welding procedures for metallic materials —

Part 5:

Approval by using approved welding
consumables for arc welding

<https://standards.iso.org/standards/catalogue/iso/disc83a-d0br-4141-9619-1995145-19956-5-1995>

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

*Partie 5: Qualification par utilisation de produits consommables de
soudage agréés pour le soudage à l'arc*



Reference number
ISO 9956-5:1995(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 9956-5 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 288-5.

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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International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

- 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*

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Introduction

In ISO 9956-1, one of the methods of welding procedure approval is by using approved welding consumables.

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Specification and approval of welding procedures for metallic materials —

Part 5:

Approval by using approved welding consumables for arc welding

1 Scope

This part of ISO 9956 applies to fusion welding of metallic materials.

The process numbers refer to ISO 4063.

This part of ISO 9956 simplifies the approval of welding procedures especially for repetitive operations.

Essentially this part of ISO 9956 covers the processes with consumables given in table 1.

It gives the necessary information to explain the requirements referenced in ISO 9956-1 about the approval of welding procedures using approved consumables.

Other fusion welding processes may be accepted by agreement between contracting parties.

In addition it gives the range of approval and the validity.

It is intended for application to parent metals which produce acceptable micro structures and properties in the heat affected zone which do not deteriorate significantly in service.

Table 1 — Applicable welding processes

Process		Process applicable for steel	Process applicable for aluminium and its alloys
Number	Type		
111	Metal arc welding with covered electrode	X	—
114	Flux-cored wire metal-arc welding without gas shield	X	—
131	Metal-arc inert gas welding; MIG welding	—	X
135	Metal-arc active gas welding; MAG welding	X	—
136	Flux-cored wire metal-arc welding with active gas shield	X	—
137	Flux-cored wire metal-arc welding with inert gas shield	X	—
141	Tungsten inert gas arc welding; TIG welding	X	X

NOTE: X indicates the process for which this part of ISO 9956 is applicable;
— indicates the process for which this part of ISO 9956 is not applicable.

This part of ISO 9956 is not applicable where hardness or impact properties, preheating, control heat input, interpass temperature and post-weld heat-treatment are specified.

The use of this part of ISO 9956 may also be restricted by an application standard or at the enquiry/order stage by contracting parties.

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

ISO 9956-2:1995, *Specification and approval of welding procedures for metallic materials — Part 2: Welding procedure specification for arc welding.*

ISO 9956-3:1995, *Specification and approval of welding procedures for metallic materials — Part 3: Welding procedure tests for the arc welding of steels.*

ISO 9956-4:1995, *Specification and approval of welding procedures for metallic materials — Part 4: Welding procedure tests for the arc welding of aluminium and its alloys.*

EN 439:1994, *Welding consumables — Shielding gases for arc welding and cutting.*

3 Definitions

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

4 Preliminary welding procedure specifications (pWPS)

The approval of a welding procedure based on approved consumables shall be based on a pWPS according to ISO 9956-2. This pWPS shall specify the range for all the relevant parameters.

5 Approval of the welding procedure

The approval of the welding procedure shall be carried out by an examiner or test body according to ISO 9956-1.

The essential items for the approval are:

- specifications of parent metal(s) to be used according to the relevant ISO;
- records of the approved consumables to be used according to the relevant ISO;
- a specific pWPS according to ISO 9956-2 and suitable for the application.

6 Range of approval

6.1 General

All the conditions of validity stated below shall be met independently of each other.

Changes of essential variables outside of the ranges specified shall require another welding procedure approval.

6.2 Related to the manufacturer

An approval of WPS obtained by a manufacturer is valid for welding in workshops or sites under the same technical and quality control of that manufacturer.

6.3 Related to the material

6.3.1 Related to parent metal

This part of ISO 9956 is applicable for limited groups of materials defined in table 2 and fulfilling all the conditions stated below.

- a) The application standard or contract does not specify Charpy testing or hardness testing of the material in the heat affected zone.

- b) Other mechanical properties (e.g. yield strength) resistance to corrosion and other essential properties of the material in the heat affected zones can be expected to be essentially unaffected by the welding and that testing is not considered necessary.
- c) The combination of parent metal(s) and consumables is such that the properties of the weld metal can be expected to correspond to the properties obtained during the approval testing of the consumable. Usually, this means that the consumable and the parent metal shall have
 - similar mechanical properties for steels in group 1;
 - similar chemical composition for steels in group 9;
 - a compatible filler metal for aluminium and its alloys in groups 21, 22a and 22b.

It also means that weld metal composition is mainly determined by the composition of the consumable.

Joints between dissimilar material groups are not permitted, except for joints between group 22a and group 22b.

Table 2 — Applicable groups of materials

Steel ¹⁾	Aluminium and its alloys ²⁾
1 ³⁾	21 ³⁾
9	22a
specified materials	22b
3), 4), 5)	3)

1) See ISO 9956-3.
 2) See ISO 9956-4.
 3) Including cast, forged and wrought material with a similar chemical composition.
 4) Materials of group 9 excluding those which are sensitive to hot cracking.
 5) A list of the acceptable materials will be added when the relevant International Standards are available.

6.3.2 Parent metal thickness

A welding procedure using approved consumables shall not be approved for thicknesses below 3 mm or above 40 mm.

6.3.3 Fillet weld throat thickness

A welding procedure using approved consumables shall not be approved for fillet weld throat thicknesses below 3 mm.

6.3.4 Diameter of pipes

Approved welding procedures using approved consumables are only valid for pipes with outside diameters > 25 mm.

6.3.5 Branch connection

For thickness: see 6.3.2.
 For diameter: see 6.3.4.

6.4 Common to all welding processes

6.4.1 Welding process

Multi-process procedures are permitted providing approved consumables are used throughout the weld.

In a multi-process procedure the approval is only valid when the processes are used in the approved specified sequence.

6.4.2 Welding positions

The position is restricted to the range of approval of the approved consumables.

6.4.3 Type of joint

There are no limitations.

6.4.4 Filler metal classification

The approval is valid for any approved filler metal with the same compulsory classification as required by the relevant filler metal specification.

In addition, non-compulsory classification should be included wherever possible.

6.4.5 Type of current

No change is permitted.

6.5 Specific to each welding process

6.5.1 Processes 111 and 114

The approval given is valid for the diameter of electrode mentioned in the pWPS, plus or minus one electrode diameter size for each run, with the excep-

tion of the root run on single sided butt welds, without backing, for which no size change is permissible.

6.5.2 Processes 131, 135, 136 and 137

The approval given is restricted to the face and/or back shielding type of gas (nominal composition) mentioned in the pWPS and shall be in accordance with EN 439.

The approval is restricted to the single-wire mentioned in the pWPS.

6.5.3 Process 141

The approval given is restricted to the face and/or back shielding type of gas (nominal composition) mentioned in the pWPS.

7 Validity

The welding procedure given is valid providing the approval of the consumables remains valid.

8 Documentation

The pWPS accepted by the examiner or a test body signed and dated is then an approved welding procedure and is to be retained on record by the manufacturer.

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