INTERNATIONAL STANDARD

**ISO 9606-4**

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# Approval testing of welders — Fusion welding —

## Part 4:
Nickel and nickel alloys

*Épreuve de qualification des soudeurs — Soudage par fusion —*

*Partie 4: Nickel et ses alliages*

Reference number
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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 3.

Draft International Standards adopted by the Technical Committees are circulated to member bodies for voting. Publication as an International Standard requires approval by at least 75 % of member bodies casting a vote.

International Standard ISO 9606-4 was prepared by the European Committee for Standardization (CEN) in collaboration with ISO Technical Committee TC 44, *Welding and allied processes*, Subcommittee SC 11, *Approval requirements for welding and allied processes personnel*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Throughout the text of this standard, read "...this European Standard..." to mean "...this International Standard...".

ISO 9606 consists of the following parts, under the general title *Approval testing of welders — Fusion welding*:

— *Part 1: Steels*

— *Part 2: Aluminium and aluminium alloys*

— *Part 3: Copper and copper alloys*

— *Part 4: Nickel and nickel alloys*

— *Part 5: Titanium and titanium alloys*

— *Part 6: Magnesium and magnesium allloys*





International Organization for Standardization
Case postale 56 • CH-1211 Genève 20 • Switzerland
Internet iso@iso.ch

Printed in Switzerland

Annexes A and ZA of this part of ISO 9606 are for information only.

For the purposes of this part of ISO 9606, the CEN annex regarding fulfilment of European Council Directives has been removed.

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## Introduction

This standard covers the principles to be observed in the approval testing of welder performance for the fusion welding of nickel and nickel alloys.

The term "nickel" stands for nickel and weldable nickel alloys.

The ability of the welder to follow verbal or written instructions and testing of his skill are therefore important factors in ensuring the quality of the welded product.

Testing of skill to this standard depends on welding methods in which uniform rules and test conditions are complied with, and standard test pieces are used.

The test weld can be used to approve a welding procedure and a welder provided that all the relevant requirements, e.g. test piece dimensions, are satisfied (see relevant part of EN 288-2).



## 1 Scope

This standard specifies essential requirements, ranges of approval, test conditions, acceptance requirements and certification for the approval testing of welder performance for the welding of nickel.

This standard applies to the approval testing of welders for the fusion welding of nickel.

This standard is intended to provide the basis for the mutual recognition by examining bodies for approval relating to welders' competence in the various fields of application. Tests will be carried out in accordance with this standard unless more severe tests are specified by the relevant application standard when these are applied.

During the approval test the welder should be required to show adequate practical experience and job knowledge (test non mandatory) of the welding processes, materials and safety requirements for which he is to be approved; information on these aspects is given in Annex A.

This standard is applicable when the welder's approval testing is required by the purchaser, by inspection authorities or by other organizations.

The welding processes referred to in this standard include those fusion welding processes which are designated as manual or partly mechanized welding. It does not cover fully mechanized and automatic processes (see 5.2).

This standard covers approval testing of welders for work on semi-finished and finished products made from wrought, forged or cast material types listed in 5.4.

The certificate of approval testing is issued under the sole responsibility of the examiner or examining body.

## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

| | |
|---|---|
| EN 287-1 : 1992 | Approval testing of welders – Fusion welding – Part 1: Steels |
| EN 288-2 : 1992 | Specification and approval of welding procedures for metallic materials – Part 2: Welding procedure specification for arc welding |
| EN 571-1 | Non destructive testing - Penetrant testing – Part 1: General principles |
| EN 910 | Destructive test on welds in metallic materials – Bend tests |
| EN 970 | Non-destructive examination of fusion welds – Visual examination |

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| EN 1289 | Non-destructive examination of welds – Penetrant testing of welds – Acceptance levels |
| EN 1320 | Destructive tests on welds in metallic materials – Fracture test |
| EN 1321 | Destructive tests on welds in metallic materials – Macroscopic and microscopic examination of welds |
| EN 1435 | Non-destructive examination of welds – Radiographic examination of welded joints |
| EN 24063 : 1992 | Welding, brazing, soldering and braze welding of metals – Nomenclature of processes and reference numbers for symbolic representation on drawings (ISO 4063 : 1990) |
| EN 25817 : 1992 | Arc-welded joints in steel – Guidance on quality levels for imperfections (ISO 5817 : 1992) |
| EN 26520 : 1991 | Classification of imperfections in metallic fusion welds, with explanations (ISO 6520 : 1982) |
| EN ISO 6947 : 1997 | Welds – Working positions – Definitions of angles of slope and rotation (ISO 6947 : 1993) |
| CR 12187 | Welding – Guidelines for a grouping system of materials for welding purposes |
| ISO 857 : 1990 | Welding, brazing and soldering processes – Vocabulary |



## 3 Definitions

For the purposes of this standard the definitions given in EN 287-1 apply.

## 4 Symbols and abbreviations

### 4.1 General

Where the full wording is not used, the following symbols and abbreviations shall be used when completing the test certificate (see Annex B of EN 287-1 : 1992).

### 4.2 Test piece

a nominal throat thickness ;
BW butt weld ;
D outside diameter of pipe ;
FW fillet weld ;
P plate ;
t plate or pipe wall thickness ;
T pipe ;
z leg length of fillet weld.

### 4.3 Consumables

nm no filler metal ;
wm with filler metal.

4.4 Miscellaneous
4.4 Miscellaneous

bs welding from both sides ;
gg back gouging or back grinding of welds ;
mb welding with backing material ;