

International Standard



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Welding — Items to be considered to ensure quality in welded structures

Soudage — Points à considérer pour s'assurer de la qualité des constructions soudées

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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 developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 6213 was developed by Technical Committee ISO/TC 44, *Welding and allied processes*, and was circulated to the member bodies in February 1982.

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It has been approved by the member bodies of the following countries :

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Belgium	Germany, F. R.	Poland
Brazil	India	Romania
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China	Italy	Sweden
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The member body of the following country expressed disapproval of the document on technical grounds :

United Kingdom

Welding — Items to be considered to ensure quality in welded structures

0 Introduction

This International Standard on items to be considered to ensure quality in welded structures has been drawn up as one of a series of documents for unit and mass produced weldments in order to ensure the unification of conditions of control of fabrication by manufacturers and inspection by the competent authorities to ensure the quality of welded constructions with reference to the service conditions.

The ultimate intention of the work is that where a manufacturer's facilities, capabilities and welded products, etc. have been approved in a given field of application by a recognized authority then that approval may also be accepted by other authorities.

On this basis, International Standards ISO 3041, ISO 3088 and ISO 3834 have been published.

When International Standards are available on the main subjects relating to manufacturing, personnel, construction and testing, the question whether they may be combined into a single International Standard will be considered.

1 Scope and field of application

This International Standard specifies minimum requirements to be met by the personnel and the equipment of the workshop if a certain quality level is required for service conditions due to national standards and regulations, specifications or mutual agreement between contracting parties.

This International Standard applies to the manufacture and repair of metallic structures using welding and/or allied processes by a firm, any of its subsidiaries or any of their subcontractors.

2 References

ISO 3041, *Welding requirements — Categories of service requirements for welded joints.*

ISO 3088, *Welding requirements — Factors to be considered in specifying requirements for fusion welded joints in steel (technical influencing factors).*

ISO 3834, *Welding — Factors to be considered when assessing firms using welding as a prime means of fabrication.*

3 Items essential to ensure quality

In order to ensure quality, the firm should have suitable equipment available and competent personnel in the workshop or on site. Adequate design of the welded structure and an adequate choice and handling of the materials shall be ensured. If specified, the required quality level of the welded joint shall be verified by testing.

3.1 Equipment

Firms shall have suitable equipment available to make acceptable welds. Equipment not belonging to the firm (workshop or site) itself may be used provided the same requirements are met.

Equipment covered by this International Standard, related to the type of manufacture, includes:

- a) workshops suitable for certain jobs, site protection against weather and suitable equipment to dry electrodes and consumables, and a means for identification, marking and storage of all materials;
- b) lifting devices for the handling of parts and structures;
- c) machines and tools, including jigs for parts to be welded;
- d) equipment for preparation, thermal cutting and welding;
- e) equipment for preheating and post-weld heat treatment;
- f) equipment for testing materials and welded joints.

3.2 Design

When designing welded structures, all loads including, for example the effect of temperature and working environments, the choice of material and its properties and the influence of the manufacturing and testing conditions shall be considered. Inspection and testing requirements shall be defined (for example, according to the relevant standards). Additional requirements may be added (for example, leakage tests, hydraulic tests, and proof of these or production test coupons).

The dimensions of the welded joints shall conform to the relevant rules, standards or other generally accepted regulations. Welding procedures shall be approved to cover the parent metal/consumable combinations chosen for the working conditions.

3.3 Fabrication

When welding or repairing joints the following shall be taken into account :

- a) access and procedures suited to the joints in question.

To achieve an acceptable welded joint the welding parameters (for example, voltage, current, polarity, travel speed, filler metal diameter, preheating) should be selected carefully depending on the parent metal and the thickness of the parts to be welded. The welding sequence and position should be relevant to the specification; suitable jigs and tools should be used, preheating and post-weld heat treatment should be applied, if necessary;

- b) careful and, if necessary, supervised preparation and material identification of the parts to be welded;
- c) employment of approved welders only. They shall be controlled by competent supervisors. If required, the welded joints shall be marked in order to identify the welder;
- d) depending on the environment, special measures to be taken (for example, on site);
- e) careful removal of any temporary welding attachments.

3.4 Personnel

Welded structures should be designed, manufactured, tested, inspected and controlled by competent personnel. Testing personnel shall be adequately trained independent of direct production.

3.4.1 Welding supervision

The authority and responsibility of those in charge of welding shall be clearly defined. Persons supervising welding functions shall have adequate training and defined responsibility. Such responsibilities should include for example :

- a) advising on the design and/or divisions on welding problems (for example, parent metal, consumables and welding procedures);
- b) checking that the welded structure complies with the relevant specification (for example, edge preparation, welding procedures, visual examination, dimensional checks, non-destructive testing and mechanical testing on samples);
- c) checking and supervising the welders' work;
- d) checking the use of correct and properly adjusted welding equipment and jigs;

- e) inspecting the storage and identification of parent metals and consumables;

- f) supervising the training and examination of welders.

Supervision of welding means that necessary measures shall be taken in case of deviation from the specifications found during fabrication. In some circumstances such measures shall to be agreed with the customer and/or responsible body before implementation.

3.4.2 Approval of welders and welding operators

Welders for manual welding, semi-mechanized welding (for example, MAG-welding) shall be approved according to the relevant standards, and shall be adequately trained.

Welding operators (for example, mechanized submerged arc welding) shall be approved in accordance with procedure approval tests or production tests.

3.5 Inspection

The inspection and testing requirements in 3.2 shall be assessed by visual, dimensional and non-destructive testing. The results shall be recorded.

The type, extent and stages of inspection shall be agreed prior to commencement of the work.

4 Capacity and capability of the workshop

The capacity and capability of the workshop (see ISO 3834), the field of application, the equipment used and the level of qualification of the personnel, shall be described including the operations and delegation of responsibility.

If a check is necessary, for example if required by the rules, standards or specifications, the responsible body shall check that the description of the workshop's capacity and capability are correct.

5 Documentation

The documents and certificates required for the fabrication shall take into account the items given in 3.3.

The same documents and also the records and certificates of approval of welders and welding operators shall be kept on file by the manufacturer; they are to be made available at any stage of the fabrication or beyond. The results of all tests and inspections, given in 3.5 performed at any stage of fabrication are also to be recorded and kept on file.

During inspection, all documents verifying that the specified requirements have been met shall be made available.

The documents on the capacity and capability of the workshop indicated in clause 4 shall also be kept on file and, if required,

made available to the responsible body for checking. In this case the responsible body certifies that all requirements have been met.

Any change that is essential to the firm's organization or to the type of work carried out (for example, supervision, welding procedure) shall be recorded and, if required, be reported to the responsible body for certification.

All documents shall usually be kept by the firm in accordance with the various standards, regulations, laws, etc.

6 Certification of the firm and validity

If certification is required, the usual validity is three years. If continuous control of the welded structures is carried out, the validity of the certification may be extended. Certification expires when essential differences occur between the workshop and its certified description.

If poor quality is revealed during or after delivery, then the certification may, after thorough investigation and discussion, be cancelled by the responsible body.

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