
**Quality requirements for fusion welding
of metallic materials —**

Part 1:
**Criteria for the selection of the
appropriate level of quality requirements**

*Exigences de qualité en soudage par fusion des matériaux
métalliques —*

*Partie 1: Critères pour la sélection du niveau approprié d'exigences de
qualité*



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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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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 2.

The main task of technical committees is to prepare International Standards. 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.

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.

ISO 3834-1 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 second edition cancels and replaces the first edition (ISO 3834-1:1994), which has been technically revised.

ISO 3834 consists of the following parts, under the general title *Quality requirements for fusion welding of metallic materials*:

- *Part 1: Criteria for the selection of the appropriate level of quality requirements*
- *Part 2: Comprehensive quality requirements*
- *Part 3: Standard quality requirements*
- *Part 4: Elementary quality requirements*
- *Part 5: Documents with which it is necessary to conform to claim conformity to the quality requirements of ISO 3834-2, ISO 3834-3 or ISO 3834-4*

NOTE A Technical Report ISO/TR 3834-6, *Quality requirements for fusion welding of metallic materials — Part 6: Guidance on implementing ISO 3834* is being prepared.

Requests for official interpretations of any aspect of this part of ISO 3834 should be directed to the Secretariat of ISO/TC 44/SC 10 via your national standards body, a complete listing which can be found at <http://www.iso.org>.

Introduction

Processes such as fusion welding are widely used to manufacture many products. In some companies, they are the key feature of production. Products may range from simple to complex. Examples include pressure vessels, domestic and agricultural equipment, cranes, bridges, transport vehicles and other items.

These processes exert a profound influence on the cost of manufacture and quality of the product. It is important, therefore, to ensure that these processes are carried out in the most effective way and that appropriate control is exercised over all aspects of the operation.

It is emphasised that ISO 3834 is not a quality management system standard replacing ISO 9001:2000. However, it can be a useful tool when ISO 9001:2000 is applied by manufacturers.

Specification of quality requirements for welding processes is important because the quality of these processes cannot be readily verified. Therefore, they are considered to be special processes as noted by ISO 9000:2000.

Quality cannot be inspected into a product, it has to be built in. Even the most extensive and sophisticated non-destructive testing does not improve the quality of the product.

For products to be free from serious problems in production and in service, it is necessary to provide controls, from the design phase, through material selection, into manufacture and subsequent inspection. For example, poor design may create serious and costly difficulties in the workshop, on site, or in service. Incorrect material selection may result in problems, such as cracking in welded joints.

To ensure sound and effective manufacturing, management needs to understand and appreciate the sources of potential trouble and to implement appropriate procedures for their control.

ISO 3834 identifies measures that are applicable for different situations. Typically, they may be applied in the following circumstances:

- in contractual situations: specification of welding quality requirements;
- by manufacturers: establishment and maintenance of welding quality requirements;
- by committees drafting manufacturing codes or application standards: specification of welding quality requirements;
- by organizations assessing welding quality performance, e.g. third parties, customers, or manufacturers.

ISO 3834 can be used by internal and external organizations, including certification bodies, to assess the manufacturer's ability to meet customer, regulatory or the manufacturer's own requirements.

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Quality requirements for fusion welding of metallic materials —

Part 1: Criteria for the selection of the appropriate level of quality requirements

1 Scope

This part of ISO 3834 provides a general outline of ISO 3834 and criteria to be taken into account for the selection of the appropriate level of quality requirements for fusion welding of metallic materials, among the three levels specified in ISO 3834-2 ^[3], ISO 3834-3 ^[4] and ISO 3834-4 ^[5]. It applies to manufacturing, both in workshops and at field installation sites.

NOTE 1 ISO 3834-2, ISO 3834-3 and ISO 3834-4 provide complete sets of quality requirements for process control related to all fusion welding processes (for each process separately or in combination as specified). ISO 3834-5 specifies the documents with which it is necessary to conform to claim conformity to the quality requirements of ISO 3834-2, ISO 3834-3 or ISO 3834-4.

This part of ISO 3834 does not specify requirements for a total quality management system. However, Clause 6 identifies quality management system elements where their inclusion will complement ISO 3834.

NOTE 2 ISO 3834-2, ISO 3834-3 and ISO 3834-4 may be used on their own by a manufacturer or in conjunction with ISO 9001:2000.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 9000:2000, *Quality management systems — Fundamentals and vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 9000:2000 and the following apply.

3.1

design specification

requirements for products specified by customers or by the organization in anticipation of customer requirements, or by regulation

NOTE The requirements for products and in some cases associated processes can be contained in, for example, technical specifications, product standards, process standards, contractual agreements and regulatory requirements.

3.2

qualified person

person whose competence and knowledge have been obtained by education, training and/or relevant practical experience

NOTE In order to demonstrate the level of competence and knowledge, a qualification test may be required.

3.3

construction

product, structure or any other welded item

3.4

**manufacturer
fabricator**

person or organization responsible for the welding production

3.5

sub-contractor

supplier of products, services and/or activities to the manufacturer in a contractual situation

3.6

welding operator

person who performs fully mechanised or automatic fusion welding processes

4 General outline of ISO 3834

ISO 3834 specifies quality requirements suitable for fusion welding processes of metallic materials. The requirements contained within this International Standard may be adopted for other welding processes. These requirements relate only to those aspects of the quality of the products, which may be influenced by fusion welding, without being assigned to any specific product group.

ISO 3834 therefore provides a method to demonstrate the capability of a manufacturer to produce products of the specified quality.

It was prepared such that:

- a) it is independent of the type of construction manufactured;
- b) it defines quality requirements for welding in workshops and/or on site;
- c) it provides guidance for describing a manufacturer's capability to produce constructions to meet specified requirements;
- d) it provides a basis for assessing a manufacturer's welding capability.

ISO 3834 is appropriate when demonstration of a manufacturer's capability to produce welded constructions, fulfilling specified quality requirements, is specified in one or more of the following:

- a specification;
- a product standard;
- a regulatory requirement.

The requirements contained within this document may be adopted in full or may be selectively deleted by the manufacturer if not applicable to the construction concerned. They provide a flexible framework for the control of welding in the following applications.

- Case 1: To provide specific requirements in specifications which require the manufacturer to have a quality management system in accordance with ISO 9001:2000 [1].
- Case 2: To provide specific requirements in specifications which require the manufacturer to have a quality management system other than ISO 9001:2000.

- Case 3: To provide specific guidance for a manufacturer developing a quality management system for fusion welding.
- Case 4: To provide detailed requirements for specifications, regulations or product standards that require control of fusion welding activities.

5 Selection of the appropriate level of quality requirements

The selection of the appropriate part of ISO 3834, specifying the required level of quality requirements, should be in accordance with the product standard, specification, regulation or contract. Because ISO 3834 may be used in a variety of situations and for different applications, definitive rules on the level of quality requirements to be adopted in individual circumstances cannot be given in this clause.

ISO 3834 may be applied in a variety of situations. The manufacturer should select one of the three parts specifying different levels of quality requirements, based on the following criteria related to products:

- the extent and significance of safety-critical products;
- the complexity of manufacture;
- the range of products manufactured;
- the range of different materials used;
- the extent to which metallurgical problems may occur;
- the extent to which manufacturing imperfections, e.g. misalignment, distortion or weld imperfection, affect product performance.

A manufacturer that demonstrates compliance to a particular quality level is considered to have established compliance to all lower levels without further demonstration [e.g. a manufacturer compliant to comprehensive quality requirements (i.e. ISO 3834-2) demonstrates compliance with standard quality requirements (i.e. ISO 3834-3) and elementary quality requirements (i.e. ISO 3834-4)].

Annex A lists criteria which assist in the selection of the appropriate part of ISO 3834.

6 Elements to be considered for a quality management system to complement ISO 3834

ISO 3834 contains many attributes that contribute to a quality management system (QMS). This clause identifies those QMS elements that the manufacturer should consider implementing to support the ISO 3834 quality requirements:

- a) control of documents and records (see ISO 9001:2000, 4.2.3, 4.2.4);
- b) management responsibilities (see ISO 9001:2000, Clause 5);
- c) provision of resources (see ISO 9001:2000, 6.1);
- d) competence, awareness and training of operational personnel [see ISO 9001:2000, 6.2.2, 7.5.2 b)];
- e) planning of product realization (see ISO 9001:2000, 7.1);
- f) determination of requirements related to the product (see ISO 9001:2000, 7.2.1);
- g) review of requirements related to the product (see ISO 9001:2000, 7.2.2);
- h) purchasing (see ISO 9001:2000, 7.4);
- i) validation of processes (see ISO 9001:2000, 7.5.2);
- j) customer property (see ISO 9001:2000, 7.5.4);
- k) internal audit (see ISO 9001:2000, 8.2.2);
- l) monitoring and measurement of product (see ISO 9001:2000, 8.2.4).

ISO 9004:2000^[2] provides guidance on the development and implementation of a quality management system.

Annex A (informative)

Criteria which assist in the selection of ISO 3834-2, ISO 3834-3 or ISO 3834-4

| No. | Element | ISO 3834-2 | ISO 3834-3 | ISO 3834-4 |
|-----|---|--|--|---|
| 1 | Review of requirements | review required | | |
| | | record is required | record may be required | record is not required |
| 2 | Technical review | review required | | |
| | | record is required | record may be required | record is not required |
| 3 | Sub-contracting | treat like a manufacturer for the specific subcontracted product, services and/or activities, however final responsibility for quality remains with the manufacturer | | |
| 4 | Welders and welding operators | qualification is required | | |
| 5 | Welding co-ordination personnel | required | | no specific requirement |
| 6 | Inspection and testing personnel | qualification is required | | |
| 7 | Production and testing equipment | suitable and available as required for preparation, process execution, testing, transport, lifting in combination with safety equipment and protective clothes | | |
| 8 | Equipment maintenance | required to provide, maintain and achieve product conformity | | no specific requirement |
| | | documented plans and records are required | records are recommended | |
| 9 | Description of equipment | list is required | | no specific requirement |
| 10 | Production planning | required | | no specific requirement |
| | | documented plans and records are required | documented plans and records are recommended | |
| 11 | Welding procedure specifications | required | | no specific requirement |
| 12 | Qualification of the welding procedures | required | | no specific requirement |
| 13 | Batch testing of consumables | if required | no specific requirement | |
| 14 | Storage and handling of welding consumables | a procedure is required in accordance with supplier recommendations | | in accordance with supplier recommendations |
| 15 | Storage of parent material | protection required from influence by environment; identification shall be maintained through storage | | no specific requirement |

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| No. | Element | ISO 3834-2 | ISO 3834-3 | ISO 3834-4 |
|-----|--|--|-----------------------------------|-------------------------------------|
| 16 | Post-weld heat treatment | confirmation that the requirements according to product standard or specifications are fulfilled | procedure and record are required | no specific requirement |
| | | procedure, record and traceability of the record to the product are required | | |
| 17 | Inspection and testing before, during and after welding | required | | if required |
| 18 | Non-conformance and corrective actions | measures of control are implemented procedures for repair and/or rectification are required | | measures of control are implemented |
| 19 | Calibration or validation of measuring, inspection and testing equipment | required | if required | no specific requirement |
| 20 | Identification during process | if required | | no specific requirement |
| 21 | Traceability | if required | | no specific requirement |
| 22 | Quality records | if required | | |

Bibliography

- [1] ISO 9001:2000, *Quality management systems — Requirements*
- [2] ISO 9004:2000, *Quality management systems — Guidelines for performance improvements*
- [3] ISO 3834-2, *Quality requirements for fusion welding of metallic materials — Part 2: Comprehensive quality requirements*
- [4] ISO 3438-3, *Quality requirements for fusion welding of metallic materials — Part 3: Standard quality requirements*
- [5] ISO 3834-4, *Quality requirements for fusion welding of metallic materials — Part 4: Elementary quality requirements*

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