TECHNICAL REPORT

ISO/TR 17663

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Welding — Guidelines for quality requirements for heat treatment in connection with welding and allied processes

Soudage — Lignes directrices concernant les exigences de qualité relatives au traitement thermique en soudage et techniques connexes

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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.

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.

In exceptional circumstances, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example), it may decide by a simple majority vote of its participating members to publish a Technical Report. A Technical Report is entirely informative in nature and does not have to be reviewed until the data it provides are considered to be no longer valid or useful.

Attention is drawn to the possibility that some of the elements of this Technical Report may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/TR 17663 was prepared by the European Committee for Standardization (CEN) in collaboration with Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 10, *Unification of requirements in the field of metal welding*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Annex ZZ provides a list of corresponding International and European Standards for which equivalents are not given in the text.

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Foreword

This Technical Report has been prepared by the Technical Committee CEN/TC 121 "Welding", of which the Secretariat is held by DS, in collaboration with the Technical Committee ISO/TC 44 "Welding and allied processes".

The Technical Committee decided to publish this Technical Report.

1 Scope

This Technical Report proposes quality requirements for heat treatment in air or controlled atmospheres carried out in workshops and on site in connection with welding and forming. It applies mainly to ferritic steels, but may be used for other materials, as appropriate.

The purpose of this report is to form as a guidance for manufacturers which perform heat treatment or produce heat treated products or components. This report may also be used as a basis for assessing the manufacturer in respect to its heat treatment capability.

The requirements contained within this report 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 heat treatment in the following cases:

– Case 1

To provide specific requirements for heat treatment in contracts which require the manufacturer to have a quality system in accordance with EN ISO 9001 or EN ISO 9002.

– Case 2

To provide specific requirements for heat treatment in contracts which require the manufacturer to have a quality system other than EN ISO 9001 or EN ISO 9002.

– Case 3

To provide specific requirements for heat treatment as guidance to a manufacturer developing a quality system.

– Case 4

To provide specific requirements for post weld heat treatment when required by EN 729-2 or EN 729-3.

– Case 5

To provide specific requirements for references in application standards which uses heat treatment as part of its requirements or agreed in a contract between relevant parties.

2 Normative references

This Technical Report 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 Technical Report only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 729-2
Quality requirements for welding - Fusion welding of metallic materials - Part 2: Comprehensive quality requirements

EN 729-3
Quality requirements for welding - Fusion welding of metallic materials - Part 3: Standard quality requirements

EN 10052
Vocabulary of heat treatment terms for ferrous products

EN ISO 13916
Welding - Guidance of the measurement of preheating temperature, interpass temperature and preheat maintenance temperature (ISO 13916:1996)

3 Terms and definitions

For the purposes of this Technical Report, the terms and definitions in accordance with EN 10052 and EN ISO 13916 apply.

In addition the following terms and definitions apply.

3.1
manufacturer
firm which performs heat treatment or produces heat treated products or components.

3.2
post weld heat treatment
heat treatment carried out after welding in order to decrease residual welding stress and/or change the micro structure.

3.3
post forming heat treatment
heat treatment carried out after forming in order to regain the original properties of the material or reduce stresses caused by the forming.

3.4
loading temperature
temperature of the furnace at the stage when the product or component is put into the furnace.

3.5
holding temperature
temperature range in which the product or component is kept in order to achive specified properties. The holding temperature depends on the type of heat treatment and material. Normally it is expressed as a temperature range.

3.6
holding time
time the product or component is kept in the holding temperature. The holding time starts when the temperature in all measuring points has reached minimum value of the range of the holding temperature and stops when one of the measuring points falls below that temperature.

The holding time depends on the type of heat treatment, material and material thickness.

3.7
unloading temperature
temperature of the product or component when it is taken out e.g. of a furnace or when any other heat treatment is finished.

4 Contract review

4.1 General

The manufacturer should review the contractual requirements and the design data. This is to ensure that all information necessary to carry out the heat treatment operations is available prior to the commencement of the work.

The manufacturer should affirm his capability to meet all heat treatment contract requirements and ensure adequate planning of all quality related activities. Contract review is carried out by the manufacturer to verify that the contract requirements are within his capability to perform, that sufficient resources are available to achieve delivery schedules and that documentation is clear and unambiguous. The manufacturer should ensure any variations between the contract and previous tender documentation are identified.

4.2 Contract review

The following items are typically considered at or before the time of the contract review. It should be ensured that all necessary information has been supplied by the purchaser.

a) the application standard to be used and appropriate drawings;

b) location and accessibility of the product or component to be heat treated;

c) type of marking of the product or component to be heat treated;

d) heat treatment specifications (appropriate heat treatment values) and inspection procedures for heat treatment;

e) the connection between heat treatment specifications and welding and/ or forming procedure specifications;

f) methods of heat treatment, e.g. which products or components are to be treated in a furnace and which products or components are subjected to local heat treatment;

g) competence of personnel;

h) suitability of equipment;

i) heat treatment documentation;

j) control and inspection arrangements;

k) quality requirements for the sub-contractor;

l) handling of non-conformances of heat treatment;

m) means of temperature measurement and recording;

n) quality requirements and testing of heat treatment, if any;

o) heat treatment in the time table for the progress of work;

p) availability of sufficient energy;

q) other special agreements, e.g. supporting of the product or component.

5 Sub-contracting

Any sub-contractor should work under the order and responsibility of the contractor and should fully comply with the relevant requirements of this report. The contractor should ensure that the sub-contractor can comply with the quality requirements of the contract.

Information to be provided by the contractor to the sub-contractor should include all relevant data from the contract review (see 4.2).

The contractor who orders heat treatment should supply all relevant specifications and requirements concerning these work to the sub-contractor. The sub-contractor should provide records and documentation of his work as may be specified by the contractor.

6 Personnel

The manufacturer should appoint a sufficient number of competent personnel for the planning, performing and supervising of the heat treatment work according to specified requirements.

The competence of personnel who will carry out heat treatment should be confirmed by the manufacturer.