

Safety Standards

of the
Nuclear Safety Standards Commission (KTA)

KTA 1408.2 (2017-11)

**Quality Assurance of Weld Filler Metals and Welding
Consumables for Pressure- and Activity-Retaining
Systems in Nuclear Power Plants
Part 2: Manufacture**

(Qualitätssicherung von Schweißzusätzen und -hilfsstoffen
für druck- und aktivitätsführende Komponenten in Kernkraft-
werken; Teil 2: Herstellung)

Previous versions of this Safety Standard
were issued 1985-06, 2008-11 and 2015-11

If there is any doubt regarding the information contained in this translation, the German wording shall apply.

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Quality Assurance of Weld Filler Metals and Welding Consumables for Pressure- and Activity-Retaining Systems in Nuclear Power Plants Part 2: Manufacture

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PLEASE NOTE: Only the original German version of this safety standard represents the joint resolution of the 35-member Nuclear Safety Standards Commission (Kerntechnischer Ausschuss, KTA). The German version was made public in the Federal Gazette (Bundesanzeiger) on May 17th, 2018. Copies of the German versions of the KTA safety standards may be mail-ordered through the Wolters Kluwer Deutschland GmbH (info@wolterskluwer.de). Downloads of the English translations are available at the KTA website (<http://www.kta-gs.de>).

All questions regarding this English translation should please be directed to the KTA office:

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Comments by the editor:

Taking into account the meaning and usage of auxiliary verbs in the German language, in this translation the following agreements are effective:

shall	indicates a mandatory requirement,
shall basically	is used in the case of mandatory requirements to which specific exceptions (and only those!) are permitted. It is a requirement of the KTA that these exceptions - other than those in the case of shall normally - are specified in the text of the safety standard,
shall normally	indicates a requirement to which exceptions are allowed. However, the exceptions used, shall be substantiated during the licensing procedure,
should	indicates a recommendation or an example of good practice,
may	indicates an acceptable or permissible method within the scope of this safety standard.

Translator's note:

In this translation distinction is still made between "weld filler metals" and "consumables", whereas the latest EN ISO standards (see e.g. Annex D) use only the term "welding consumables" for all types of filler metals, electrodes, wires, rods, fluxes, pastes, etc.

Fundamentals

(1) The safety standards of the Nuclear Safety Standards Commission (KTA) have the task of specifying those safety-related requirements which shall be met with regard to precautions to be taken in accordance with the state of science and technology against damage arising from the construction and operation of the plant (Sec. 7, para. (2), subpara. (3) Atomic Energy Act - AtG) in order to attain the protective goals specified in AtG and the Radiological Protection Ordinance (StrlSchV) and further detailed in the Safety Requirements for Nuclear Power Plants (SiAnf) and the SiAnf-Interpretations.

(2) The "Safety Requirements for Nuclear Power Plants" require in no. 3.4 "Requirements for the reactor coolant pressure boundary and the pressure-retaining walls of components of the external systems" and no. 3.6 "Requirements for the containment system" the integrity of the pressure retaining walls as well as in requirement no. 5 (3) a documentation showing that the current condition of the safety-relevant measures and equipment fulfils the applicable requirements. Thus, to ensure proper weld connections, it follows that weld filler metals and welding consumables shall be subject to special quality assurance.

(3) When manufacturing, storing and using weld filler metals and welding consumables, it is essential that such properties are obtained and maintained which ensure that the welds meet the requirements over the entire scheduled operating time. This will be achieved by careful

- selection of the initial materials,
- production of the weld filler metals and welding consumables, and
- observation of the prescribed processing conditions.

(4) When manufacturing weld filler metals and welding consumables, care shall be taken to ensure that the basic materials are of the desired quality, that the identity of the materials

is traceable in the course of manufacture and that the required properties are obtained. Tests shall be carried out to ensure that these aims are achieved.

(5) The safety standards of the KTA 1408 series are closely related to the following safety standards:

KTA 3201.3 Components of the Reactor Coolant Pressure Boundary of Light Water Reactors; Part 3: Manufacture,

KTA 3211.3 Pressure- and activity-retaining Components outside the Primary Circuit; Part 3: Manufacture

KTA 3401.3 Steel Containment Vessels; Part 3: Manufacture.

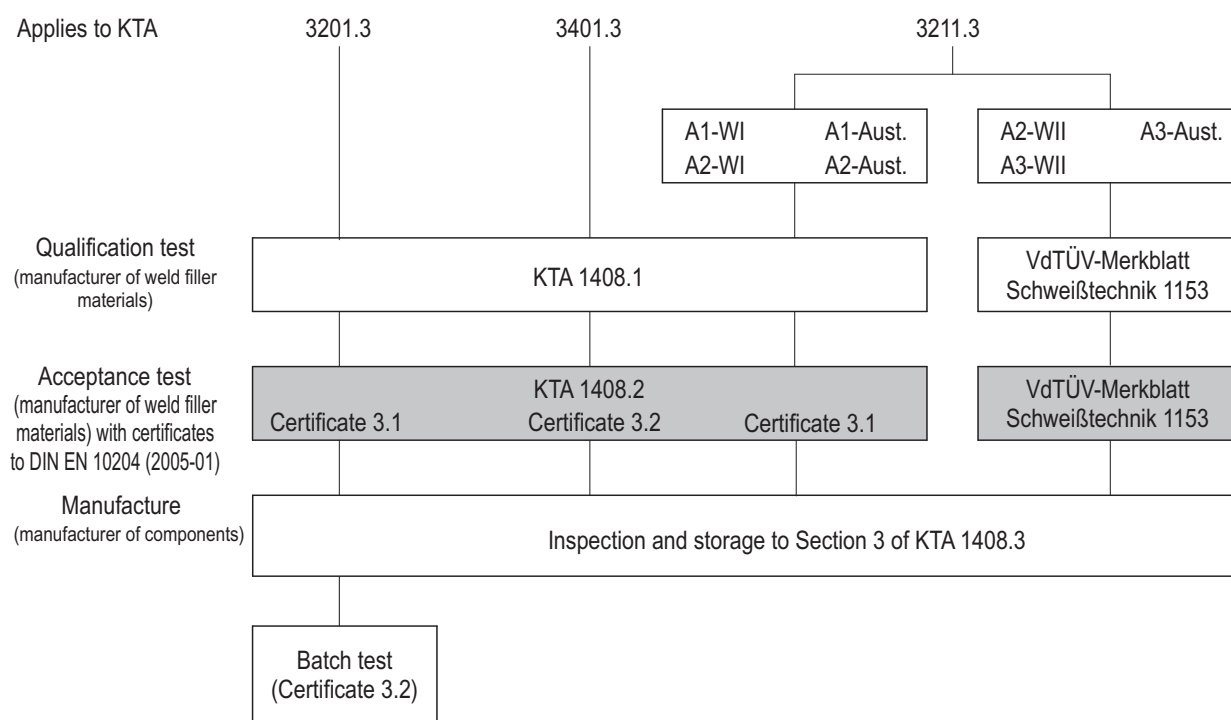
These safety standards specify the requirements for welds which are produced using the weld filler metals and welding consumables dealt with in this safety standard.

1 Scope

(1) This safety standard applies to the manufacture of weld filler metals and welding consumables (see **Figure 1-1**) which are to be used in the fabrication of product forms, parts and subassemblies for pressure-retaining walls of components of stationary nuclear power plants with light water reactors. These include:

- the components of the primary circuit (KTA 3201),
- the steel containment vessels (KTA 3401),
- the pressure- and activity-retaining components of systems outside the primary circuit (KTA 3211) - only Class 2 components -, except for the austenitic steels A2-WII, A3-WII and A3.

(2) This safety standard covers the certificates to be submitted by the manufacturer, the requirements with respect to manufacture, the in-process inspections during fabrication and the tests of the weld filler metals and welding consumables. These requirements shall be taken into account when ordering the materials.



A1, A2, A3 : Test groups

W I, W II : Materials groups

Further details on these values can be found in safety standards KTA 3211.1 and KTA 3211.3.

Figure 1-1: Requirements regarding weld filler metals and welding consumables

2 Definitions

(1) Purchase specification

A purchase specification is a document accompanying an order which specifies the properties of the item of supply as well as the technical data to be adhered to.

(2) Production unit

a) Wire and strip electrodes, filler wires and welding rods

A production unit of wire and strip electrodes as well as filler wires and welding rods is defined as a combination of heat and product size.

b) Rod electrodes

A production unit of rod electrodes is the consistently uniform combination of a powder mixture of a consistent recipe, core wire heat and diameter, fabricated on a single production line, in a single shift.

If the coating mass of a production unit consists of several powder mixtures, their identity shall be individually demonstrated. The type of identity check is specified when auditing the manufacturer.

A powder mixture unit shall be understood to be the largest homogeneous mixture and depends on the size of the mixing container. Depending on the type of process, it may be wet or dry.

c) Flux cored electrodes

A production unit of flux cored electrodes is the consistently uniform combination of powder mixture of a consistent recipe and heat of the electrode coating as well as its diameter, and must be manufactured on a single production line in a single shift.

d) Fluxes

A production unit of fluxes is that amount of flux which is produced using a consistent recipe and consistent manufacturing conditions in a given production period and applying consistent testing procedures. The production period shall be specified during the initial audit of the manufacturer.

e) Inert gases

A production unit of inert gases need not be specified. The question of batch size shall be clarified on the occasion of the initial audit of the manufacturer.

(3) Batch

A batch is that amount of weld filler metals whose properties or conditions are determined by means of tests. A production unit can be subdivided into several batches.

(4) Authorized inspector

The authorized inspector for the tests and inspections to be conducted in accordance with this safety standard is the authorized inspector called in by the licensing or supervisory authority in accordance with Section 20 of the Atomic Energy Act. The tests/inspections required by this safety standard shall be conducted on the basis of a respective order by the competent authority.

(5) Welding consumables

Consumables are products which make possible and alleviate the welding process e.g. inert gas, flux or paste.

(6) Weld filler metal

A material added during the welding process and contributing to the formation of a welded joint.

3 Certification of the manufacturer

(1) The manufacturer shall initially submit to the authorized inspector certificates regarding his quality assurance measures and his technical production capabilities.

(2) The manufacturer shall have at his disposal a quality assurance department that is independent of production and that, during manufacture and within the scope of the final inspection, performs tests in accordance with written criteria.

(3) The NDT operators shall have been qualified and certified to DIN EN ISO 9712 in the product sector "welded products" for the applicable examination procedure.

(4) The procedure for assuring the identity of basic materials and finished products shall be specified within the scope of the initial certification.

(5) The authorized inspector shall periodically, generally at two year intervals, examine the assurance of quality during the manufacture of weld filler metals and welding consumables. A detailed report shall be drawn up regarding the initial certification with particular emphasis on the quality assurance measures taken. The periodic verifications should confirm that all the measures taken are continuously adhered to.

(6) If weld filler metals and welding consumables are manufactured at several production facilities, certifications are required for each of these production facilities. The verification by the authorized inspector shall also extend to supply stores (e.g. suppliers who are not manufacturers).

(7) The authorized inspector shall issue a certificate on each periodic verification to the manufacturer or supplier concerned.

Note:

The requirements regarding the manufacturing plant are considered as being fulfilled if a verification in accordance with Sec. 4 of VdTÜV-Merkblatt Schweißtechnik 1153 in conjunction with DIN EN 12074 has been carried out.

4 Tests and inspections during manufacture

4.1 Receiving inspection of the basic materials for weld filler metals and welding consumables

(1) The order specifications for the constituent materials for wires and bands shall specify at least the requirement for a melt analysis and an unambiguous allocation of the constituent materials to the melt. The manufacturer of the constituent materials shall certify that the smallest unit supplied comes from only a single melt.

(2) With respect to each supplied unit of the constituent material (e.g. ring or coil) the manufacturer shall carry out a quantitative analysis of the chemical composition in order to confirm the quality and identity of the constituent material,

(3) The constituent materials for fluxes, coatings and filler metals shall be supplied in compliance with the order specification and shall be subjected to a receiving inspection.

4.2 Ensuring the traceability of identity during manufacture of weld filler metals and welding consumables

4.2.1 Ensuring the traceability of identity of wire and strip electrodes as well as filler wires and welding rods

(1) Prior to the cutting or processing of wire rings or coils, their traceability of identity shall be ensured.

(2) Each wire ring or coil shall consist of only one melt. It is not admissible to attach finished products to each other by welding.

4.2.2 Ensuring the traceability of identity of strip electrodes and flux cored electrodes

(1) Prior to the cutting or processing of wire or bands, their traceability of identity shall be ensured.