

Safety Standards

of the
Nuclear Safety Standards Commission (KTA)

KTA 1202 (2017-11)

Requirements for the Testing Manual

(Anforderungen an das Prüfhandbuch)

The previous versions of this safety standard were issued in 1984-06 and 2009-11

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

Editor:

KTA-Geschaefsstelle

c/o Bundesamt fuer kerntechnische Entsorgungssicherheit (BfE)

Willy-Brandt-Str. 5 • 38226 Salzgitter • Germany

Telephone +49 (0) 30 18333-1621 • Telefax +49 (0) 30 18333-1625

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Requirements for the Testing Manual

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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 17, 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:

KTA-Geschäftsstelle c/o BfE, Willy-Brandt-Strasse 5, D-38226 Salzgitter, Germany or kta-gs@bfe.bund.de

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, 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.

Basic Principles

(1) The safety standards of the Nuclear Safety Standards Commission (KTA) have the objective to specify safety-related requirements, compliance of which provides the necessary precautions in accordance with the state of the art in science and technology against damage arising from the construction and operation of the facility (Sec. 7 para. 2 subpara. 3 Atomic Energy Act - AtG) in order to achieve the fundamental safety functions specified in the Atomic Energy Act and the Radiological Protection Ordinance (StrlSchV) and further detailed in the Safety Requirements for Nuclear Power Plants as well as in the Interpretations of the Safety Requirements for Nuclear Power Plants.

(2) Relevant acts, ordinances and rules of the federal and state authorities (Länder) as well as subordinate legal specifications, such as the Safety Requirements for Nuclear Power Plants (approved by the Länder Committee for Nuclear Energy) or the Guidelines of the Reactor Safety Commission, are taken into consideration when developing KTA safety standards.

(3) Nuclear power plants are subject to inservice inspections in order to ensure, among other things, that the nuclear power plant is in the condition corresponding to the one specified in the license.

(4) The inservice inspections to be performed on safety-related systems and components are based on considerations resulting from the safety analysis of the overall plant and from the requirements of the system and component-related standards as well as of the license. The majority of these inservice inspections is compiled in a testing schedule which, in accordance with Sec. 3 para. 1 no. 6 Nuclear Licensing Procedure Ordinance (AtVfV), is part of the safety specifications. The sequence of these tests is presented in individual testing instructions. The testing schedule and testing instructions are the essential constituent parts of a testing manual. The testing manual shall be regarded within the framework specified under Sec. 6 "Requirements for the Operating Rules" in the Safety Requirements for Nuclear Power Plants.

(5) This safety standard describes the contents, layout and the preparation of the testing manual and of its parts. Thus, requirements are specified for the testing manual by which

- a) a secured organizational procedure is established for performing, evaluating and documenting inservice inspections, and which are intended to help in ensuring
- b) that the respective tests produce results which can be properly evaluated,
- c) that the results of successive tests are comparable to each other, and
- d) that, on account of a detailed planning of inservice inspections, the personnel involved in performing these inspections receive the least possible radiation exposure.

1 Scope

This safety standard applies to the contents, layout and preparation of the testing manual for a stationary nuclear power plant with the testing schedule and the testing instructions listed in this schedule. It applies to the inservice inspections of all safety-related systems and their components and devices that are specified in the nuclear licensing procedure.

2 Definitions

(1) Testing instruction

A testing instruction specifies the work steps for carrying out and for performing and documenting a test including the prerequisites and boundary conditions.

(2) Testing schedule

A testing schedule is the compilation of tests with binding specifications in regard to the test object, type of test, extent of test, testing instructions, test interval and operating condition of the plant.

Note:

The testing schedule of the inservice inspections that are specified in the licensing procedure for safety-related systems and their components as well as devices is part of the safety specifications. In accordance with safety standard KTA 1201, the safety specifications are part of the operating manual.

(3) Testing time schedule

The testing time schedule is an organizational tool which specifies, both, the dates for performing the inservice inspections as well as the individual department responsible for carrying out the respective test.

(4) Standard testing instruction

A standard testing instruction contains the specification of the individual work steps of a specific test which will be carried out in the same manner on a number of test objects. It serves as supplement to the testing instruction.

3 Contents and Layout of the Testing Manual

3.1 Outline

The testing manual shall be subdivided as follows:

- a) Application Notes (cf. Section 3.2),
- b) Testing Schedule (cf. Section 3.3), and
- c) Testing Instructions (cf. Section 3.4).

3.2 Application Notes

3.2.1 Introduction

(1) If necessary for the handling of the testing manual, an introductory chapter shall normally contain

- a) a description of the general structure of the testing manual (cf. Section 3.2.2), and
- b) explanatory details regarding the testing schedule and testing instructions (cf. Section 3.2.3).

(2) The introduction shall, furthermore, contain details regarding the plant-internal specifications of

- a) the procedure in case of a required participation by authorized experts (cf. Section 3.2.4),
- b) the organization with regard to performing and evaluating the tests (cf. Section 3.2.5),
- c) the rules of conduct with regard to observing the testing instructions (cf. Section 3.2.6),
- d) the tolerance ranges with regard to testing intervals (cf. Section 3.2.7),
- e) the procedure for modifying and amending the testing manual (cf. Section 3.2.8).

In this context, it is permissible to refer to possibly applicable sections of the operating manual.

3.2.2 General structure of the testing manual

A brief description of the general structure of the testing manual shall be presented. It shall become evident from this description

- a) that the testing schedule of the inservice inspections specified in the licensing procedure for safety-related systems and their components as well as devices is part of the safety specifications,

- b) how and where those inservice inspections are presented that are required, solely, on the basis of the German Industrial Code (e.g., German Equipment and Product Safety Act) and other legal regulations, and
- c) how and where other inservice inspections (e.g., plant-internally specified tests) are presented.

3.2.2 Explanatory details regarding the testing schedule and testing instructions

- (1) The ordering criteria on which the sequence of the tests in the testing schedule are based shall be specified.
- (2) The abbreviations used in the testing schedule shall be explained.
- (3) The structure of a testing instruction shall be described. This shall include a description of the alpha-numeric identification code for the testing instructions and of the ordering criteria on which the identification code is based.

3.2.4 Procedure in case of participation by authorized experts

The procedure for the case of a required participation of authorized experts in the tests (e.g., presence during testing, personal execution of the test) shall be described including preparation, execution and evaluation of the test. It is permissible to reference further documents.

3.2.5 Organization with regard to performing and evaluating the tests

The plant-internally specified organization for ensuring that the tests are properly performed and evaluated shall be described. The description shall put special emphasis on the cooperation between the organizational units responsible for the respective systems and the organizational units responsible for performing and evaluating the tests and, altogether, with the shift group. It is permissible to reference further documents.

Note:

The conversion of the testing intervals from the testing schedule is carried out using testing time schedules. These are strictly organizational tools and, therefore, not part of this safety standard.

3.2.6 Rules of conduct with regard to observing the testing instructions

It shall be emphasized that, basically no deviations from the testing instructions are permissible. The general procedure shall be described that applies in the exceptional case that a deviation from the individual instruction becomes necessary, and that ensures that the required quality assurance measures are taken.

3.2.7 Tolerance ranges with regard to testing intervals

(1) Time-dependent tests

For the time-dependent tests, the permissible tolerance ranges of the test intervals shall be specified.

(2) Event-dependent tests

It shall be explained that no test intervals and, thus, no tolerance ranges need to be specified in case of tests that can be performed only in conjunction with specific events (e.g., testing of start-up channels, leak tightness test of a sealing face after filter replacement).

(3) Starting and finishing time of a test

The starting and finishing time of a test shall basically lie within its permissible tolerance range. The general procedure shall be

described for the exceptional case of a deviation from the permissible tolerance range.

3.2.8 Procedure for modifying and amending the testing manual

The general procedure for modifying and amending the testing manual shall be described.

3.3 Testing Schedule

3.3.1 General requirements

- (1) The inservice inspections shall be compiled in a clearly structured testing schedule that shall contain the following information:

- a) Test object (cf. Section 3.3.2),
- b) Type of test (cf. Section 3.3.3),
- c) Extent of the test (cf. Section 3.3.4),

Note:

The detailed extent of the test is contained in the corresponding testing instruction (cf. Section 3.4.7),

- d) Testing instruction (cf. Section 3.3.5),
- e) Testing interval or reason for the test (cf. Section 3.3.6), and
- f) Operating condition of the plant (cf. Section 3.3.7).

- (2) This testing schedule is part of the safety specifications and, therefore, as specified under safety standard KTA 1201, a constituent part of the operating manual. The testing manual shall make reference to the operating manual or shall contain a copy of the testing schedule.

3.3.2 Test object

- (1) The individual object to be tested shall be specified in plain text together with its alpha-numeric identification code. Test objects are, e.g., systems, subsystem, components, sub-units, electrotechnical equipment, instrumentation and control equipment, operating and auxiliary means.

- (2) Individual or redundant components of the same design may be described as one single test object. However, the individual components or redundancies shall be enumerated

- (3) Test objects shall be subdivided or grouped together in such a way that the type and corresponding extent of the test can be unambiguously correlated to the individual test object.

3.3.3 Type of test

The type of test to be employed in the respective testing of the test object shall be specified in short terms

Note:

Typical types of tests are, e.g., visual inspection, internal inspection, function test, pressure test, leakage test, non-destructive examination, chemical analysis and measurements.

3.3.4 Extent of the test

- (1) If the extent of the test cannot be deduced from other specifications of the testing schedule, the extent of the test to be performed on the test object shall be presented as a keyword description for every type of test involved.

- (2) In case the extent of the test has been specified in standards, then, alternatively, a reference to the individual standard and corresponding section may be given.

3.3.5 Testing instruction

For each test the testing instructions to be used shall be specified unambiguously by means of its alpha-numeric identification code.

Note:

The actual state of revision of the testing instructions is not given in the testing schedule but in a separate list of the valid testing instructions (see Section 5.2).

3.3.6 Testing interval or reason for the test

(1) The test interval or reason for the test established in the licenses or applicable standards shall be specified.

The units of test intervals or reasons for the test shall be specified, e.g.,

- a) as, e.g., day [d], week [w], month [m], year [y], or
- b) as shutdowns for refueling or maintenance, or
- c) as preventive maintenance during power operation, or
- d) as a particular event.

The testing interval shall, as required, be specified in multiples of these specific units.

(2) In the case of tests which are carried out as partial tests (e.g. by components, or in the case of components of the same design), the temporal sequence shall normally be described (e.g., "one component each week" in the column "Extent of the test").

(3) The test interval shall be specified separately for tests performed by the licensee and for tests with participation by the authorized expert under Sec. 20 AtG.

3.3.7 Operating condition of the plant

(1) The operating conditions and operating phases of the plant shall be specified that must be attained before the individual test may be performed.

Note:

The operating condition of the test object is not described in the testing schedule but, rather, in the testing instruction as specified under Section 3.4.10 para. 1.

(2) The characterizations used in the testing schedule for the operating conditions and operating phases of the plant shall be the same as those defined in the operating manual (e.g., power operation, phases of no-power operation as specified under Sec. 7.1 item i) of safety standard KTA 1201).

3.4 Testing Instructions

3.4.1 General

(1) A testing instruction shall normally have the following structure

- a) Identification code of the testing instruction (cf. Section 3.4.2),
- b) Test object (cf. Section 3.4.3),
- c) Test basis (cf. Section 3.4.4),
- d) Type of test (cf. Section 3.4.5),
- e) Goal of the test (cf. Section 3.4.6),
- f) Extent of the test (cf. Section 3.4.7),
- g) Test and examination procedure (cf. Section 3.4.8),
- h) Auxiliary means and documents (cf. Section 3.4.9),
- i) Prerequisites for the test (cf. Section 3.4.10),
- k) Testing procedure and documentation (cf. Section 3.4.11),
- l) Establishing a defined final condition (cf. Section 3.4.12).

(2) Inservice inspections shall be performed using the respective valid testing instructions, and shall be documented.

(3) Such information (particularly referring to the test method, the auxiliary means and documents) which shall normally be used in the same way for several test objects may be concentrated in a single standard testing instruction. The testing instructions shall unambiguously reference these standard testing instructions.

3.4.2 Identification code of the testing instruction

The alpha-numeric identification code of the testing instruction shall be specified on the cover page together with the state of revision and, if applicable, its correlation to the testing schedule.

3.4.3 Test object

The test object from the testing schedule shall be specified in plain text together with its alpha-numeric identification code.

3.4.4 Test basis

The basis which led to the specification of the test (e.g., conditional provision of the license, regulatory requirement) shall be specified under the heading "Test Basis".

3.4.5 Type of test

The type of test in accordance with the testing schedule shall be specified. If required, more than one type of test shall be specified.

3.4.6 Goal of the test

The superordinate goal which shall normally be achieved with the individual test steps (e.g., verification of the functional capability of the residual heat removal equipment or of the closure of the building; verification of the leak-tightness of a containment isolating valve) shall be described in brief terms under the heading "Goal of the Test".

3.4.7 Extent of the test

(1) Here, the extent of the test to be performed on the test object shall be specified in detail. Also, for each individual type of test, the individual component to be tested or the testing location shall be specified.

(2) Regarding randomly performed tests, in particular the non-destructive examinations, the areas to be subjected to the tests or the selection of the random sample shall, additionally, be specified.

(3) If necessary, the individual test segments to be examined within the test interval shall be specified.

3.4.8 Test procedure

The test procedure to be used for carrying out the type of test shall be specified, e.g.: test operation, signal simulation or operational controls (function test); endoscopy (visual examination); pressure decay method (leak-tightness test); ultra-sonic, magnetic-particle, liquid-penetrant, eddy-current examination procedures (non-destructive examinations).

Note:

Requirements for the examination procedures are dealt with in safety standard KTA 1402 "Management Systems for the Operation of Nuclear Facilities" (in preparation).

3.4.9 Auxiliary means and documents

The auxiliary means specifically required to achieve the goal of the test (e.g., special tools, lifting equipment, measurement devices, measurement means, test processors, signal transmitters for physical variables such as milliampere transducers, pressure supply package, variable resistor blocks, frequency generators) shall be specified, as well as the documents (e.g., system layout diagrams, site plans, function diagrams, or standard testing instructions) which must be taken along to the testing location in addition to the testing instructions.

Note:

Requirements for the inspection, measuring and testing equipment are dealt with in Sec.10 of safety standard KTA 1401 "General Requirements for Quality Assurance".

3.4.10 Prerequisites for the test

(1) The operating conditions which are necessary at the start of the test shall be specified:

- a) operating condition of the plant as specified under Section 3.3.7,
- b) operating condition of the respective systems and their components as well as devices (e.g., arbitrary, stand-by, operating, shutdown),
- c) reduced availabilities due to test performances must be named, and
- d) condition of the test object (e.g., depressurized, emptied, cleaned, dried, release switched)

Note:

The detailed description of the work tasks with regard to achieving the prerequisites of the test are established in accordance with the procedure specified in the Maintenance Regulation of the operating manual.

(2) The measures to be taken after starting the test shall be specified under the heading "Testing Procedure" (cf. Section 3.4.11).

3.4.11 Testing procedure and documentation

(1) The activities and measures required of the personnel to establish assured test results and to secure the condition of the plant, including the subsequently required measures, shall be specified in the form of (written) instructions. In the case of function tests, the instructions shall be written in the form of step programs.

Note:

The procedures and measures necessary for the establishment of the required plant conditions before testing are subject to the same requirements. Alternatively instructions with the same level of quality assurance are referenced.

(2) The instructions shall be structured as individual testing steps in which the necessary work tasks including the extent of the test and the test procedure shall be specified, if applicable, with reference to the corresponding standard testing instruction, for each individual test object.

(3) The required test values including permissible deviations, any additional boundary conditions as well as the type and extent of the documentation shall be specified.

Note:

The test object is considered unavailable until a detailed evaluation is available, if the test result is outside the permissible deviations.

3.4.12 Establishing a defined final condition

(1) The conditions normally required for the test object and for the concerned systems or components after having been tested shall be specified in the testing instruction.

(2) The procedure for establishing the defined final condition in the course of performing the testing procedures and documentation specified under Section 3.4.11 shall be specified in the form of (written) instructions.

3.5 Test Certificate

(1) Each test performed shall be documented by a test certificate. This test certificate shall contain all data necessary for the evaluation and assessment of the test.

(2) These data include

- a) the department responsible for carrying out the test,
- b) the test object in accordance with the testing schedule,
- c) the extent of the test in accordance with the testing schedule,
- d) the type of test in accordance with the testing schedule,
- e) the identification number of the testing instruction and, if applicable, of the standard testing instruction,
- f) the required and the actual date, and the testing interval,
- g) the test results (e.g., goal of the test achieved, existing deviations, measures which were taken or are still required, necessary re-examinations), and
- h) confirmatory note by the individually responsible person regarding the test, the test results and the assessment of the results.

(3) A test certificate form may be an integral part of the testing instruction.

4 Physical Form and Layout

(1) The testing manual shall be designed in accordance with Sec. 4 of safety standard KTA 1201.

(2) In addition, the following applies to the testing instructions:

- a) The form and layout of the testing instructions shall be tuned to the peculiarities of the individual task and shall take ergonomic requirements into consideration.
- b) The testing procedure (cf. Sections 3.4.11 and 3.4.12) shall be presented in the form of procedural instructions in accordance with Sec. 4.7 of safety standard KTA 1201,
- c) Testing instructions shall normally be self-explanatory without having to check on other information sources outside of the documents which must be taken along to the testing location. In the case of references, the specification of the referenced location shall be exact and unambiguous.
- d) In case a copy of the individual testing instruction shall be used for documentation purposes, sufficient room shall be provided for completion remarks and checkmarks.
- e) The individual testing instruction shall normally be provided with sufficient room for handwritten remarks by the tester.

5 Preparation and Documentation

5.1 Time Plan for Preparing the Testing Schedule and Testing Instructions

5.1.1 Testing schedule for inservice inspections

The respective part of the testing schedule for inservice inspections of an individual system shall be available before its process-based commissioning.

5.1.2 Testing instructions

- (1) When setting up the testing instructions, experience gained from manufacture, installation and commissioning as well as from operating experience shall be taken into consideration.
- (2) The testing instructions in its valid version shall be available in good time before performing the test.
- (3) Amendments to testing instructions (e.g., on account of experience gained from operation or from performing tests, or on account of new testing procedures) shall be incorporated in the testing instructions in good time before the next test.

5.2 Updating Procedure

- (1) An updating procedure shall be specified and installed to ensure that the testing manual is up-to-date and complete at all times. It shall be ensured
 - a) that changes of any circumstances that are relevant to the testing manual are transferred to the testing manual,
 - b) that all changes of, and amendments to the testing manual can be traced back to the original,

- c) that the current state of revision is marked on each application note and individual testing instruction,
- d) that a register is kept of the valid testing instructions. This register may be managed in form of a computerized data base.

Note:

The updating procedure for the testing schedule is specified under Sec. 12 of safety standard KTA 1201.

- (2) An exchange procedure (e.g. frequency of exchange, feedback, postal address) shall be arranged with the users of registered copies of parts of the testing manual (e.g., testing schedule).

5.3 Documentation

- (1) The reasons for changes of, and amendments to the testing schedule and testing instructions, as well as the specification of the initial test, shall be documented.
- (2) Likewise, the printout of the register of the valid testing instructions to be maintained as specified under Section 5.2 para. 1 item d) shall be incorporated in the documentation.

Appendix

Regulations and Literature Referred to Within this Safety Standard

(Regulations referred to in this safety standard are valid only in the version cited below. Regulations which are referred to within these regulations are valid only in the version that was valid when the latter regulations were established or issued.)

AtG		Act on the peaceful utilization of nuclear energy and the protection against its hazards (Atomic Energy Act – AtG) of December 23, 1959, in the new version promulgated on July 15, 1985 (BGBl. I 1985, p. 1565), last revised by Article 2 of the Law of July 20, 2017 (BGBl. I p. 2802)
AtSMV		Ordinance on the nuclear safety officer and the reporting of accidents and other events (Nuclear Safety Officer and Reporting Ordinance - AtSMV) of October 14, 1992 (BGBl. I, p. 1766), last revised by Article 1 of the Ordinance of June 18, 2002 (BGBl. I, p. 755)
StrlSchV		Ordinance on the protection from damage by ionizing radiation (Radiological Protection Ordinance – StrlSchV) of July 20, 2001 (BGBl. I, p. 1714; 2002 I, p. 1459), most recently changed according to Article 10 by Article 6 of the Act of January 27, 2017 (BGBl. I, p. 114, 1222)
SiAnf	(2015-03)	Safety Requirements for Nuclear Power Plants (SiAnf) of 22 November 2012 (BAnz AT 24.01.2013 B3), revised version of 3 March 2015 (BAnz AT 30.03.2015 B2).
Interpretations to SiAnf	(2015-03)	Interpretations of the "Safety Requirements for Nuclear Power Plants of 22 November 2012" (BAnz AT 24.01.2013 B3), revised version of 3 March 2015 (BAnz AT 30.03.2015 B2)
KTA 1201	(2015-11)	Requirements for the operating manual
KTA 1401	(2017-11)	General Requirements Regarding Quality Assurance
KTA 1402	(2017-11)	Integrated Management Systems for the Safe Operation of Nuclear Power Plants