Safety Standards

of the

Nuclear Safety Standards Commission (KTA)

KTA 3401.4 (06/91)

Steel Containment Vessels;

Part 4: Inservice Inspections

(Reaktorsicherheitsbehälter aus Stahl;

Teil 4: Wiederkehrende Prüfungen)

Version 06/91 of KTA 3401.4 replaces previous version 03/81.

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

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KTA SAFETY STANDARD

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PLEASE NOTE: Only the original German version of this safety standard represents the joint resolution of the 50-member Nuclear Safety Standards Commission (Kerntechnischer Ausschuss, KTA) The German version was made public in Bundesanzeiger No 53a on March 16, 1991 Copies may be ordered through the Carl Heymanns Verlag KG, Luxemburger Str. 449, D-50939 Koeln (Telefax 0221-4601092)

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Comment by the editor:

In these English translations of KTA Safety Standards the words **shall**, **should** and **may** are used with the following meanings:

shall	indicates a mandatory requirement,
should	indicates a requirement [1] to which exceptions are allowed. However, the exception used shall be substantiated during the licensing procedure,
may	indicates a permission and is, thus, neither a requirement (with or without exceptions) nor a recommendation: recommendations are worded as such, e.g., "... and it is recommended that ...".

The word combinations **basically shall** or **shall basically** are 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 **should** - are specified in the text of the safety standard.

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[1] Please note that in the case of IAEA NUSS standards and ANSI standards, the word **should** indicates a mere recommendation.

Basic Principles

(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 the damage arising from the construction and operation of nuclear facilities (Sec. 7 para. 2 no. 3 Atomic Energy Act), in order to attain the protective goals specified in the Atomic Energy Act and the Radiological Protection Ordinance.

(2) For nuclear power plants, these protective goals are further detailed in the Safety Criteria for Nuclear Power Plants issued by the BMU (Federal Minister for the Environment, Nature Conservation and Reactor Safety)

(3) The task of the containment vessel is to withstand the postulated pressure and temperature loads which may occur during incidents involving a release of radioactive substances inside the containment vessel, and in particular in the case of the design basis leakage cross section of the primary reactor coolant pipe; it shall withstand these loads in such a way that any inadmissible release of radioactive substances into the environment is prevented For this reason, the containment vessel, including all penetrations and cooling devices insofar as their function is necessary for coping with the consequences of incidents, shall be designed and arranged in such a way that the containment vessel will withstand the static, dynamic and thermal loads which may occur in connection with the above mentioned incidents and their consequences, provided the design basis leakage rate is [not exceeded]

(4) For example, the containment vessel is designed as a technologically gas-tight steel sphere into which the necessary pipe and cable penetrations as well as air locks are inserted.

(5) For this type of containment vessel to be able to fulfill the mentioned tasks, engineering and administrative measures such as

a) choice and application of materials characterized by a high toughness and a good workability,

b) stress related analytic and structural design,

c) choice of fabrication and test procedures and the documentation of the test sequence and test results,

d) unambiguous instructions for the tasks required for manufacturing the materials and for their subsequent processing

are specified.

These measures are dealt with in KTA 3401 Part 1: Materials, Part 2: Design and Analysis and Part 3: Manufacturing

(6) The present Part 4 deals with the inservice inspections of the containment vessel, the air locks (KTA 3402 and KTA 3409), the assembly and transportation hatches, the pipe and cable penetrations (KTA 3407 and KTA 3403), as well as of the isolating devices for the operating system pipes penetrating the containment vessel (KTA 3404).

Part 4, Inservice Inspections, is correlated with the requirements of the Parts 1, 2 and 3 and applies in connection with these parts

(7) The object of this safety standard is to specify the extent and time intervals for the regular inservice inspections of the above mentioned components performed with the aim to repeatedly demonstrate their integrity and functionality

1 Scope

(1) This safety standard applies to steel containment vessels of light water reactors, including those components integrally connected to the containment vessel of the air locks, the assembly and transportation hatches, the pipe and cable penetrations, as well as of the isolating devices for the operating system pipes penetrating the containment vessel

(2) The safety standard also applies to containment vessels equipped with a pressure suppression system and an external liner.

(3) This safety standard applies to all regular inservice inspections subsequent to first criticality including the first recurrent integral leakage rate test (pre-operation leakage rate test)

2 Definitions

(1) Representative locations

A representative location is a location where the inservice inspection will enable the deduction of sufficient safety related information for other locations, components or component parts, taking material, design, quality of fabrication as well as type, amplitude and frequency of stressing into account.

3 Inservice Inspection

3.1 Requirements Regarding Examination Procedures

3.1.1 General

Examination procedures and techniques shall be chosen such that all flaws of any safety relevance can be detected

3.1.2 Visual Examination

(1) Visual examinations serve to evaluate the general condition during walk-throughs of the plants as well as to evaluate the condition of individual components (targeted inspection).

During visual inspections, special attention shall be paid to:

a) surface changes (e g , corrosion scars, crack initiation),

b) mechanical damages (e g , friction surfaces, deformations),

c) condition of the safety locks of bolts,

d) condition of the connections of measurement points and conductors,

e) indications of leakages,

f) play distances for the displacements to be considered,

g) moisture penetrations into the soft-material intermediate layers or insulation.

(2) The test shall be performed by ocular inspection, possibly with aid of auxiliary optical devices (if the distance between test object and eye needs to be shortened or an otherwise hidden test object has to be made visible to the eye).

3 1 3 Leakage Test

The leakage test of the air locks, assembly and transportation hatches as well as of the isolation devices and compartments of pipe penetrations shall be performed, e g ,

a) by increasing the pressure and applying foaming materials to the sealing surfaces, or

b) with the aid of the leakage exhaust system, or

c) by determining the rate of pressure increase or decrease.

3.2 Component Related Examinations

3 2 1 Examinations of the Containment Vessel

3 2 1 1 Visual Examinations

(1) The wall of the containment vessel, the nozzle regions of air locks and pipe penetrations, the region of the assembly hatch openings, the seals of the grip sections as well as the weld seams of mountings on the pressure retaining wall of the containment vessel shall be subjected to visual examinations The examinations shall be extended, basically, to all regions visually accessible without disassembly.

(2) The operator and the authorized expert shall jointly perform visual examinations in annual intervals randomly on representative locations of partial regions [The regions shall be chosen such that,] within a period of four years, the entire accessible surface will be covered.

(3) The visual examinations of the regions of thermal insulation shall be randomly performed [such that,] within a period of four years, [the entire surface is covered,] with special attention being paid to corrosive damages [and] to changes in the insulation capability caused by influx of moisture

3 2 1 2 Leakage Test

The leakage test of the containment vessel shall be performed by an integral leakage rate test in accordance with Sec 3 4

3 2 1 3 Nondestructive Examinations of the Weld Seams

The nondestructive examinations of the weld seams of the containment vessel shall be performed in accordance with the criteria specified in Sec. 3 2 8.

3 2 2 Examinations of the Air Locks

3 2 2 1 Visual Examinations

(1) The gate seals, hydraulic or pneumatic drives, electrical devices, pressure retaining walls, moveable rail sections and the air lock supports shall be subjected to visual examinations. The regular visual examinations shall extend to all regions visually accessible without disassembly. During the extended visual examinations, removable coverings shall be taken down.

(2) The regular visual examinations shall be carried out in monthly intervals by the operator and the extended visual examinations in annual intervals jointly by the operator and the authorized expert For containment vessels with an inert gas atmosphere, differing examination intervals may be specified in agreement with the authorized expert in well founded cases

3 2 2 2 Functional Tests

(1) Functional tests shall be conducted on drives, controls, protective devices, and the alarm, telephone and lighting devices.

(2) Functional tests shall be carried out by activating operational functions including the priority controls of the air lock gates (cf KTA 3402 and KTA 3409).

(3) The functional tests on personnel air locks shall be performed by the operator in monthly intervals and those on material locks in semiannual intervals; once a year, these tests shall be performed in the presence of the authorized expert. For containment vessels with an inert gas atmosphere, differing examination intervals may be specified in agreement with the authorized expert in well founded cases.

3 2 2 3 Leakage Tests

(1) Leakage tests shall be conducted on the gate seals, pressure compensation equipment and penetrations for mechanical drive elements as well as on the seals of removable connecting elements of, e g , man hole covers, blind covers, sight glasses and pipe and cable penetrations. Sec 3 2 5 applies to cable penetrations

(2) The leakage tests on gate seals, pressure compensation equipment and penetrations for mechanical drives shall be performed in annnual intervals by the operator in the presence of the authorized expert

(3) The leakage tests on the seals of removable connections of, e g., man hole covers, blind covers, sight glasses and pipe penetrations shall be performed in 4 year intervals by the operator in the presence of the authorized expert.

3 2 2 4 Nondestructive Examinations of the Weld Seams

The nondestructive examinations of the weld seams of the air locks shall be conducted in accordance with the criteria specified in Sec. 3 2 8

3 2 3 Examinations of the Assembly and Transportation Hatches

3 2 3 1 Visual Examination

(1) The assembly and transportation hatches as well as the vessel closures connected to the containment vessel by pressure-retaining bolt connections shall be subjected to visual examinations The visual examinations shall extend to all regions visually accessible without disassembly or auxiliary devices.

(2) The visual examinations shall be jointly conducted by the operator and the authorized expert in four-year intervals.

(3) Every time before reseating an assembly or transportation hatch, its sealing surfaces shall be subjected to a visual examination jointly by the operator and authorized expert

3 2 3 2 Leakage Tests

(1) Leakage tests shall be conducted on the seals of the assembly and transportation hatches as well as of the vessel closures connected to the containment vessel by pressure-retaining bolt connections.

(2) The leakage tests shall be conducted by the operator in the presence of the authorized expert following every re-installation of the individual cover.

3 2 3 3 Examination of Physical Condition

The re-installation of the covers of assembly and transportation hatches and of the vessel closures connected to the containment vessel by pressure-retaining bolt connections shall be performed in accordance with design-reviewed [written] instructions

3 2 3 4 Nondestructive Examinations of the Weld Seams

The nondestructive examinations of the weld seams of assembly and transportation hatches and of vessel closures connected to the containment vessel by pressure-retaining bolt connections shall be conducted in accordance with the criteria specified in Sec. 3 2 8

3 2 4 Examinations of the Isolation Devices

In specifying the inservice inspections for the isolation devices in pipes penetrating the containment vessel, the isolation devices shall be differentiated into those within

a) pipes transporting reactor coolant,

b) pipes that open to the containment vessel atmosphere and serve as air inlet and air exhaust in the phase of power operation,

Note: Pipes are considered as opening to the containment vessel atmosphere if they directly connect the atmosphere inside with that outside of the containment vessel

c) pipes that open to the containment vessel atmosphere and serve as air inlet and air exhaust in the phase of reduced pressure of the primary curcuit,

d) pipes with a nominal inner diameter < DN 50 that open to the containment vessel atmosphere and serve in the operational surveillance,

e) pipes that neither transport reactor coolant nor open to the containment vessel atmosphere,

f) pipes with a nominal inner diameter ≤ DN 80 that serve in the inertisation of boiling water reactors, where the isolation device is basically closed and open only during the inertisation process,

g) pipes with a nominal inner diameter between > DN 80 and ≤ DN 250 that serve in the inertisation of boiling water reactors, where the isolation device is basically closed and open only during the inertisation process,

h) pipes with a nominal inner diameter > DN 80 that serve in the inertisation of boiling water reactors, where the isolation device is closed in the phase of power operation and open only in the phase of reduced pressure of the primary curcuit

3 2 4 2 Visual Examinations

(1) Systems supplying the isolation devices with auxiliary media and electrical power shall be subjected to visual examination with special regard to their proper connections and freedom from any external damage.

(2) Ventilation valves shall be visually examined from the outside, and from the inside only as far as possible without disassembly

(3) The examination intervals and institutions responsible for performing the examinations are specified in **Table 4-1**. For containment vessels with an inert gas atmosphere, differing examination intervals may be specified in agreement with the authorized expert in well founded cases

3 2 4 3 Functional Tests

(1) The functionality of each isolation device under Sec. 3 2 4 1 shall be tested by a proper operational initiation, unless this test was already performed when testing the reactor protection system. Additionally, the achievement of the required positioning time shall be demonstrated

(2) If the closed position of an isolation device is secured by an interlock, the functional test shall be extended to also testing thios interlock.

(3) The examination intervals and institutions responsible for performing the examinations are specified in **Table 4-1**. For containment vessels with an inert gas atmosphere, differing examination intervals may be specified in agreement with the authorized expert in well founded cases

3 2 4 4 Leakage Tests

(1) The isolation devices in accordance with Sec. 3 2 4 1, items b), c), g) and h) shall be subjected to leakage tests. The tests shall extend to the leak tightness of the isolation device and of moveable penetrations through the valve casing.

(2) If the design of the isolation devices in accordance with Sec. 3 2 4 1, item g) and h) does not allow for a component specific leakage test, e.g., in the case of double gasket seals, then the leakage test of the valves shall be performed using the test connector between the two isolation devices.

(3) The examination intervals and institutions responsible for performing the examinations are specified in **Table 4-1**

3 2 5 Examinations of the Cable Penetrations

3 2 5 1 Visual Examinations

(1) The cable penetrations and the blind flanges of reserve openings shall be subjected to visual examinations

(2) The operator and the authorized expert shall jointly perform visual examinations in annual intervals on random lots of representative [cable] penetrations. The random lot shall be chosen such that, within a period of four years, every cable penetration will be covered.

3 2 5 2 Functional Examinations

Insofar as the functionality of the cable penetrations are not monitored during operation of the corresponding electrical device, their proper function shall be ascertained in the inservice inspections specified for the particular electrical device.

3 2 5 3 Leakage Tests

Using appropriate procedures (bubble test, halogen test, helium leakage test), the operator in the presence of the authorized expert shall annually subject three randomly selected cable penetrations to leakage tests, testing the leak tightness between cable penetration flange and containment vessel wall and of the weld seam of the cable penetration. The overall leak tightness of the cable penetrations shall be demonstrated in connection with the test of the containment vessel in accordance wit h Sec. 3.4. The examination intervals and institutions responsible for performing the examinations are specified in **Table 4-1**.

3 2 6 Examinations of the Pipe Penetrations

3 2 6 1 Visual Examinations

(1) All components of the pipe penetrations within the scope of KTA 3407, with the exception of internal regions of chambered pipe penetrations, shall be subjected to visual examinations, especially the expansion joints. In the case of insulated, medium filled pipes, the visual examination may confined to representative locations of weld seam and pipe regions

(2) The operator and the authorized expert shall jointly perform visual examinations in annual intervals on random lots of representative pipe penetrations. The random lot shall be chosen such that, within a period of four years, every pipe penetration will be covered. In the case of pipe penetrations of design type IV in accordance with KTA 3047, the visual examination of the region between the exhaust pipe and the medium filled pipe may be confined to one pipe penetration in a four year testing interval

(3) In the case of medium filled pipes, the requirements specified in KTA 3201 4 or the corresponding specifications for pressure and activity retaining components of systems outside of the primary circuit shall be taken into consideration

3 2 6 2 Leakage Tests

(1) Alle pipe penetrations shall be subjected to leakage tests:

a) The leak tightness of all unchambered pipe penetrations shall be demonstrated within the frame of the integral leakage rate test of the containment vessel in accordance with Sec. 3 4.

b) The leakage tests of the chambers of compensated pipe penetrations shall be performed by the operator in the presence of the authorized expert in annual intervals.

(2) The examination intervals [of chambered pipe penetrations] may be changed in agreement with the authorized expert if the chambers have an internal over-pressure that is continuously monitored

3 2 7 Additional Examinations of Containment Vessels Equipped with Pressure Suppression System and External Liner

3 2 7 1 Visual Examinations

(1) The liner, condensation chamber and its internals, the swing check valves and burst plates, and the support structure of the internal cylinder shall be subjected to a visual examination extending to all internal and external regions visually accessible without disassembly.

(2) The visual examinations shall be conducted by the operator in intervals of two years and every four years jointly with the authorized expert. On the occasion of the examinations in four year intervals, the water shall be removed from the condensation chamber. A partial reduction of the water level is permitted, provided, this does not jeopardize the test results.

(3) Depending on the results of the visual examination of the condensation chamber, the operator and authorized expert may have to conduct additional examinations of heavy-duty regions in four year intervals, e.g. clad bond examinations.

3 2 7 2 Functional Tests

(1) The swing check valves in the roof of the condensation chamber shall be subjected to functional tests. In these tests the opening force of the swing check valves shall be checked.

(2) A direct force measurement shall be employed in this check (e.g. by using a spring balance)

(3) The functional tests shall be performed in four year intervals by the operator in the presence of the authorized expert. Additionally, the operator shall test the swing check valves subsequent to their actuation

3 2 7 3 Leakage Tests

(1) Leakage tests shall be conducted on the pressure suppression system to check for leakages between the pressure chamber and the condensation chamber. The test shall consist of applying an air current of a constant volumetric rate to the pressure chamber. The elapsed time needed for the differential pressure between pressure and condensation chamber to reach 0.015 MPa shall be measured. Given the net volume of the pressure chamber, the leakage can then determined from the inflation time and volumetric air current. Equivalent procedures to the one described above may be employed

(2) The leakage tests shall be performed in two year intervals by the operator in the presence of the authorized expert. Additionally, the operator shall conduct a leakage test on the swing check valves subsequent to their actuations.

3 2 7 4 Nondestructive Examinations of the Weld Connections

The nondestructive examinations of the weld seams in the regions of the pressure suppression system shall be conducted in accordance with the criteria specified in Sec. 3 2 8.

3 2 8 Criteria for Nondestructive Examinations of Weld Connections

Those locations of weld connections subjected to operational stressess higher than 25% of the permissible primary stresses in accordance with Table 3.5-1 KTA 3401 2, stress level 1 (load case - normal operation) shall be subjected to random nondestructive examinations by the authorized expert in four year intervals. The examinations shall be conducted, and the test results evaluated, in accordance with KTA 3401.3.

3.3 Leakage Rate Test by Means of the Leakage Exhaust System

(1) The leak tightness of the components connected to the leakage exhaust system as well as the leak tightness of the system itself shall be quantitatively determined in a joint measurement.

(2) The test shall be performed during stationary operation of the leakage exhaust system by determining the established under pressure and the volumetric flow

(3) The leakage rate test shall be performed by the operator in the presence of the authorized expert both at the beginning and at the end of the major inspection.

3.4 Integral Leakage Rate Test

(1) The integral leakage rate test of the reactor containment vessel including the air locks, assembly and transportation hatches, the isolation devices, and cable and pipe penetrations shall be carried out using the absolute pressure method

(2) The test procedure, requirements for the plant condition, the test pressure and test sequence as well as the the evaluation of the test results shgall comply with KTA 3405

(3) Inservice integral leakage rate tests shall be performed during a plant outage (e g refuelling outage) after

a) completion of all maintenance activities affecting the leak tightness and

b) performance of all required component related leakage tests specified under Sec. 3.2

(4) The first inservice integral leakage rate test (pre-operational leakage rate test) shall be conducted in the time period between the pressure test of the primary circuit and first criticality

(5) The intervals for the subsequent inservice integral leakage rate tests are specified in **Table 3-1**. If the permissible leakage rate is only achieved after repair measures have been taken, then the further procedures require the agreement of the authorized expert.

Testing Interval	Number of years after first criticality
1 year	1 +)
4 years	5
4 years	9
4 years	13
4 years	etc.
+) during first scheduled refuelling	

Table 3-1: Testing intervals for the inservice integral leakage rate tests

4 Collation of Examination Intervals and Responsibilities for Performing the Examinations

(1) The examination intervals and institutions responsible for performing the examinations in accordance with Sec. 3 are specified in **Table 4-1**.

(2) The examination intervals may deviate from the specified values within the following tolerances:

in case of 1 month	± 8 days
in case of 3 months	± 16 days
in case of 1 year	± 2 months
in case of 2 years	± 4 months
in case of 4 years	± 6 months

(3) Those examinations that can only be conducted when the reactor is shut down shall be carried out during regular refuelling.

4) Considering that the time span between two refuellings can be up to 18 months, that refuelling shall be chosen for conducting an examination that comes closest to the due date of the particular examination. If this leads to longer time intervals than specified, the due dates for the next inservice inspections shall be advanced accordingly such that, in the long run, the averaged time intervals meet the values as specified [in **Table 4-1**]. In case a plant shutdown lasts more than six months, special arrangements may be agreed upon.

5 Test Instructions and Documentation

(1) Every inservice inspection of the reactor containment vessel and its components listed in Sec. 1 shall be collated in a testing schedule; this schedule, together with the corresponding test instructions shall become part of the testing manual of the plant.

(2) The requirements for the testing manual including contents, structure, layout and creation of the testing schedule and test instructions are specified in KTA 1202.

(3) The perfomance and the results of the inservice inspections shall be documented. The test documents shall become part of the plant documentation.

(4) The requirements for the documentation are specified in KTA 1404.

(5) Insofar as abbreviations and symbols are used in the documentation, these shall be chosen in accordance with Sec. 11.3 KTA 3401.3 and Appendix A KTA 3405, or they shall be explained in the individual document.

	Components	Type of Examination	Examination Intervals		KTA Section	Remarks
			Operator	Authorized Expert		
1	containment vessel	visual examination integral leakage rate test NDE	(1y) 4y 4y -	(1y) 4y 4y 4y	3 2 1 1 3.4 3.2 1.3	(1y) = annual partial lot in accordance with **Table 3-1** criteria in accord. with Sec. 3.2.8
2	personnel air locks	visual examination visual examination functional test leakage test leakage test NDE	1y 1m[1)] 1m[1)] 1a 4a -	1y - 1y 1y 4y 4y	3 2.2.1 3 2 2.1 3 2 2.2 3 2 2.3(2) 3.2.2.3(3) 3.2.2.4	extended visual examination regular visual examination criteria in accord. with Sec. 3.2.8
3	material air locks	visual examination visual examination functional test leakage test leakage test NDE	1y 1m[1)] 6m[1)] 1a 4a -	1y - 1y 1y 4y 4y	3.2.2.1 3.2.2.1 3.2.2.2 3 2 2 3(2) 3.2.2.3(3) 3.2.2.4	extended visual examination regular visual examination criteria in accord. with Sec. 3.2.8
4	assembly and transportation hatches	visual examination leakage test examination of physical condition NDE	4y after installation during installation -	4y after installation during installation 4a	3 2 3.1 3 2 3.2 3 2 3 3 3.2.3.4	sealing surface prior to reseating criteria in accord. with Sec. 3.2.8
5	isolation devices in accordance with 3 2 4 1 a)	visual examination functional test positioning time test	RF RF RF	RF RF RF	3.2.4.2 3.2.4.3 3.2.4.3	
	isolation devices in accordance with 3 2.4.1 b)	visual examination functional test positioning time test leakage test	3m[1)] 3m[1)] 6m[1)] RF	1a 1a 1a RF	3 2 4 2 3 2 4.3 3 2 4.3 3.2.4.4	
	isolation devices in accordance with 3 2 4 1 c)	visual examination functional test positioning time test leakage test	RTO RTO RF RF	- - RF RF	3.2.4.2 3.2.4.3 3.2.4.3 3.2.4.4	
	isolation devices in accordance with 3 2.4 1 d)	visual examination functional test positioning time test	3m[1)] 3m[1)] RF	- - RF	3.2.4.2 3.2.4.3 3.2.4.3	
	isolation devices in accordance with 3 2.4.1 e)	visual examination functional test positioning time test	RF RF 2 RF	RF RF 2 RF	3 2 4 2 3.2.4.3 3.2.4.3	
	isolation devices in accordance with 3 2.4 1 f)	visual examination functional test positioning time test	3m[1)] 3m[1)] RF	- - RF	3.2.4.2 3.2.4.3 3.2.4.3	
	isolation devices in accordance with 3 2 4.1 g)	visual examination functional test positioning time test leakage test	3m[1)] 3m[1)] RF RF	- - RF RF	3.2.4.2 3 2 4 3 3 2 4 3 3.2.4.4	
	isolation devices in accordance with 3 2.4 1 h)	visual examination functional test positioning time test leakage test	RTO RTO RF RF	- - RF RF	3 2 4.2 3.2.4.3 3 2 4 3 3.2.4.4	
6	cable penetrations	visual examination leakage test	(1y) 4y 1y	(1y) 4y 1y	3.2 5 1 3.2.5.3	(1y) = annual partial lot random test of 3 penetrat.
7	pipe penetrations	visual examination leakage test	(1y) 4y 1y	(1y) 4y 1y	3 2 6.1 3.2.6.3	(1y) = annual partial lot chambered pipe penetrat.
8	reactor containment vessel with pressure compensation system (BWR)	visual examination functional test leakage test NDE	2y 4y 2y -	4y 4y 2y 4y	3 2 7.1 3.2.7.2 3 2 7 3 3.2.7.4	 swing check valves [2)] swing check valves [2)] criteria in accord. with Sec. 3.2.8
9	leakage exhaust system	leakage rate test	RF	RF	3 3	at beginning and end of major inspection

Nomenclature: y = year, m = month, RF = refuelling, RTO = return to operation

[1)] For containment vessels with an inert gas atmosphere, differing examination intervals may be specified in agreement with the authorized expert in well founded cases.

[2)] Additional test by operator after each actuation of the swing check valve.

Table 4-1: Examination intervals and institutions responsible for performing the examinations

Appendix A

Regulations Referred to in this Safety Standard

(Regulations referred to in this safety standard are valid only in the version cited below)

KTA 1202	(06/84)	Requirements for the Testing Manual
KTA 1404	(06/89)	Documentation During the Construction and Operation of Nuclear Power Plants
KTA 3201.4	(06/90)	Components of the Reactor Coolant Pressure Boundary of Light Water Reactors; Part 4: Inservice Inspections and Operational Monitoring
KTA 3401.1	(09/88)	Steel Containment Vessels; Part 1: Materials
KTA 3401.2	(06/85)	Steel Containment Vessels; Part 2: Analysis and Design
KTA 3401.3	(11/86)	Steel Containment Vessels; Part 3: Manufacture
KTA 3402	(11/76)	Air Locks through the Containment Vessel of Nuclear Power Plants - Personnel Locks
KTA 3403	(10/80)	Cable Penetrations through the Reactor Containment Vessel
KTA 3404	(09/88)	Isolation of Operating System Pipes Penetrating the Containment Vessel in the Case of Release of Radioactive Substances into the Containment Vessel
KTA 3405	(02/79)	Integral Leakage Rate Testing of the Containment Vessel with the Absolute Pressure Method
KTA 3407	(06/91)	Pipe Penetrations through the Reactor Containment Vessel
KTA 3409	(06/79)	Air Locks for the Reactor Containment Vessel for Nuclear Power Plants - Material Locks