Safety Standards

of the
Nuclear Safety Standards Commission (KTA)

KTA 1201 (2015-11)

Requirements for the Operating Manual

(Anforderungen an das Betriebshandbuch)

The previous version of this safety standard was issued in 2009-11

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 35-member Nuclear Safety Standards Commission (Kerntechnischer Ausschuss, KTA). The German version was made public in the Federal Gazette (Bundesanzeiger) on May 06, 2015. 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).

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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, 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 Radio-logical 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) The “Safety Requirements for Nuclear Power Plants” (SiAnf) demand that the radiological safety goals specified in SiAnf Nr. 2.5 must be attained. Essential in this regard are specified written instructions, which are required according to SiAnf Nr. 6 “Regulations for the operating rules”. The operating manual shall normally contain the administrative procedures and technical actions required for the specified normal operation and for the control and mitigation of design basis accidents (incidents.

(3) According to SiAnf Nr. 6 (1) a) the operating rules must contain a sufficiently complete set of regulations (safety specifications – SSp), which - via abidance to the safety specifications - ensure, that the design, surveillance and operation of the plant is in full compliance with the “Safety Requirements for Nuclear Power Plants” and the conditions specified in the license. The safety specifications must include procedural limits and plant states that must be abided. In addition, they must include requirements for the effectiveness, availability and environmental conditions of safety related systems (limits and conditions for safe operation).

(4) In fulfillment of Sec. 3 of the Ordinance on the Procedure for Licensing Facilities under Sec. 7 AtG (Nuclear Licensing Procedure Ordinance - AtVfV), so-called safety specifications (SSp) are submitted together with the license application. These safety specifications present the safety-related framework within which the facility must be operated in order to fulfill the protective purpose pursued by Sec. 1 no. 2 AtG. The safety specifications are contained in the operating manual.

(5) The objective of this safety standard is to specify the requirements applying to the content and layout of the operating manual.

(6) Requirements for the testing manual are specified in safety standard KTA 1202 ”Requirements for the Testing Manual”.

(7) The content and layout of the emergency manual relating to the ”plant-internal accident management” are specified in safety standard KTA 1203 “Requirements for the Emergency Manual”. The transition from the operating manual to the emergency manual is dealt with in the present safety standard.

1 Scope

(1) This safety standard applies to the contents and layout of the operating manual of a nuclear power plant.

(2) It is recommended to apply the outline and structure as specified in this safety standard; different outlines and structures are permissible, provided, they present the required contents. The contents related requirements for the operating manual under the present safety standard relate to the suggested outline and structure. They shall be properly converted when using a different outline and structure.

(3) Neither the technical instructions regarding plant regulations nor the maintenance documents nor the design and construction documents shall be considered as part of the operating manual.

2 Definitions

(1) Operating manual

The operating manual contains all operation and safety-related regulations, including the safety specifications, that are required for specified normal operation of the plant and for the elimination of defects and for the control and mitigation of design basis accidents (incidents), and it contains an appendix with various listings, documents and additional regulations that are the basis of the operational part of the operating manual and that are supplemental or explanatory to this part.

(2) Plant organization

Plant organization has two aspects, that of the plant organizational structure describing the hierarchical structure and that of the plant administrative organization describing the operational procedures and processes.

(3) No-power operation

The phase of no-power operation begins at the point of permanent subcriticality and ends at the point of reaching criticality with the intent of beginning power operation.

N o t e :

Practical differentiations to power operation are specified in the operating manual.

(4) Shift group

Shift group is understood to identify that group of people of one shift that are involved in monitoring plant operation in the control room and in the plant.

(5) Shift personnel

Shift personnel is the entire staff in all shift groups.

(6) Protective goals (fundamental safety functions)

Protective goals are main safety functions, which comprise subsidiary safety functions. The protective goals must ensure, that the associated acceptance targets and acceptance criteria are met.

N o t e :

The protective goals that must be contained in the operating manual are specified for each plant during the licensing procedure.

(7) Safety specifications (SSp – in accordance with Sec. 3 para. 1 no. 6 AtVfV)

Safety specifications are a compilation of all plant regulations, important information and measures that are relevant to the safety of the plant and its operation, as well as of the information and measures required for the control and mitigation of malfunctions and design basis accidents (incidents). The global plan for the scheduled tests (testing schedule) on safety-related systems and plant components is, likewise, part of the safety specifications.

N o t e :

The purpose of the safety specifications is to provide for the operating personnel all currently valid data, limit values and measures important to the safety of the nuclear power plant and its operation.

Furthermore, safety specifications are part of the licensing documents and, thus, a legally binding and up-to-date documentation of the framework of safe and licensed conditions and operating procedures for the plant, and they are also the basis for specifying necessary changes and modifications of the plant or of its operation.

(8) Design basis accident (incident)

A design basis accident is a chain of events which, when occurring, would interfere with the operation of the plant or with a task activity in such a way that the operation or the task activity must be interrupted for reasons of safety, and for which the plant must be designed and, with regard to task activities, for which protective measures must be provided. (Source: StrlSchV)

Note:

In this KTA standard the definition was taken from StrlSchV, because this definition comprises external and internal influences and is compatible with the to date structure of the operating manual.

(9) Handling of a design basis accident

Handling of design basis accidents (incidents) means taking measures upon the occurrence of a design basis accident with the goal of bringing the plant into a controlled and safe condition and to limit the effects from the accident.

Handling of a design basis accident (incident) is subdivided into

a) Condition oriented (protective-goal oriented) handling of a design basis accident (incident)

   Measures for handling the accident are specified with regard to the condition of the plant (e.g., deviation of plant parameters, of circuitry and availability conditions of the systems and components; coincidence with particular conditions of other parameters; temporal behavior).

b) Event oriented handling of a design basis accident (incident)

   The condition of the plant is correlated to an event specified in the ”Safety Requirements for Nuclear Power Plants”, or to a specific design basis accident (incident) treated in the licensing procedure. The measures for handling a design basis accident are executed in the sequential order written down in the instructions specified for this particular event.

3 Requirements Pertaining to the Operating Manual, Contents

3.1 General Requirements

(1) The operating manual shall contain all operating and safety-related instructions, limit values and conditions which are required for specified normal operation of the plant and for the control and mitigation of design basis accidents (incidents), and shall include, at least, the plant regulations specified under para. 3 no.1. These plant regulations are valid for all persons working within the power plant.

(2) If, for special operating modes, the operating instructions of the operating manual are replaced or supplemented by separate instructions (e.g. shift instructions, commissioning instructions), this shall be properly marked in the operating manual.

(3) The following subjects shall be treated in the operating manual; however, the outline presented is considered as only one possible example. Other outlines are permissible, provided the requirements regarding the specified contents are met.

0. Part 0 Table of Contents and Introduction

1. Part 1 Plant Regulations

a) Personnel Organization
b) Control Room and Shift Regulation
c) Maintenance Regulation
d) Radiation Protection Regulation
e) Guard and Access Regulation
f) Alarm Regulation
g) Fire Protection Regulation
h) First Aid Regulation

2. Part 2 Plant Operation

a) Pre-requisites and Conditions for Operation
   aa) General Pre-requisites and Conditions for Operation of the Plant
   ab) Pre-requisites and Conditions for Power Operation
   ac) Pre-requisites and Conditions for the Phases of No-power Operation
b) Safety-related Limit Values
c) Testing Schedule
d) Criteria for Notifiable Events
e) Normal Operation
f) Abnormal Operation

3. Part 3 Design Basis Accidents (Incidents)

a) Condition Oriented (Protective-goal Oriented) Handling of Design basis accidents (incidents)
b) Event Oriented Handling of Design Basis Accidents (Incidents)

4. Part 4 Systems Operation

a) Nuclear Power Production including Containment
b) Nuclear Auxiliary Systems
c) Water-Steam Circuit
d) Steam Turbine System
e) Coolant Water System
f) Auxiliary and Ancillary Systems, Water Supply and Disposal
g) Electrical Systems and the Instrumentation and Control Systems
h) Handling of Fuel Assemblies and of Heavy Loads inside the Containment Vessel

5. Part 5 Malfunction and Hazard Alarms

6. Appendix

3.2 Safety Specifications (SSp)

(1) The safety specifications shall be incorporated in the operating manual.

(2) The following parts from the outline under Section 3.1 para. 4 of the operating manual are safety specifications and shall be clearly marked as such (cf. Section 4.9):

a) All plant regulations (cf. Section 6),
b) Pre-requisites and conditions for operation (cf. Section 7.1),
c) Safety-related limit values (cf. Section 7.2),
d) Criteria for notifiable events (cf. Section 7.4),
e) Handling cases of abnormal operation – concise version (cf. Section 7.6 para. 3),
f) Schematic decision guide for determining the procedural measures in the event of a design basis accident (incident) (Section 8 para. 4),
g) Treatment of design basis accidents (incidents) (cf. Section 8 paras. 5 through 7),
h) Testing schedule (cf. Section 7.3),

i) Listing of the licensing documents (cf. Section 11 para. 2 item a),

j) Specified updating procedure for the operating manual (cf. Section 12).

4 Requirements Pertaining to the Operating Manual, Layout

4.1 General Requirements

(1) The creation and modification of the operating manual and the management of the data stock should be computer supported for all display forms of information and should be based on one single data base. The following points shall, among others, be considered:

a) Uniform layout of the chapters (e.g. basic formatting, positioning and textual structuring),

b) Modular structure of the chapters and text passages,

c) Data base compliant structure allowing the coordination with other information systems, e.g., with a plant data base,

d) Assured protection against unauthorized changes, and

e) Safe and redundant data storage.

(2) In the case of information display forms other than paper media (e.g. CRT-monitors, multi media), these requirements shall be applied accordingly with ergonomic aspects being taken into consideration.

(3) When utilizing various display media, special attention shall be paid to compatibility; thus, it is permissible that, e.g., the color coding on the monitor displays is supplemented and replaced by an appropriate form coding with regard its black-and-white presentation on paper.

4.2 Physical Form and Layout

(1) The operating manual shall be designed in the form of loose-leaf binders allowing for amendments and changes at any time.

(2) Cross references to other chapters of the operating manual and to supplemental documents shall be included as required.

(3) The individual pages shall be formatted such that they can be easily copied (e.g. with regard to the revision service or to their utilization as checklists). This shall not lead to any loss of information and shall have no essential effects adverse to legibility.

(4) The German letter format A4 upright (210 mm by 297 mm) shall be chosen for textual material.

(5) The format of technical drawings and tables shall normally be limited to height of A4 upright and to a maximum foldout width of about 900 mm (arm's length). If an insufficient legibility results from these measurements, the respective technical drawing or table shall, additionally, be made available in larger format in the vicinity of the control room.

(6) With respect to the marking and handling, the following aspects shall be taken into consideration:

a) Size and structure shall normally be chosen with ease of handling taken into account

b) The spine of the individual binders shall be marked unambiguously identifying their respective contents.

c) The operating manual (BHB) shall be subdivided into chapters. Each chapter shall be preceded by a title page, an index listing the state of revision for each page, and a table of contents.

d) Each page of the operating manual shall be unambiguously identifiable (e.g. chapter, section, page number, state of revision).

e) The state of revision shall be unambiguously identifiable.

4.3 Font Type and Size

A well legible font type in a sufficient size shall be chosen.

4.4 Textual Structure and Layout

(1) In accordance with DIN 1422-1, texts shall be subdivided into short sections and paragraphs corresponding to their logical and contextual relationship. As required, these shall be numbered in accordance with DIN 1421. Individual sections shall be provided with headings in accordance with DIN 1421.

(2) Texts shall be structured such that the eye is properly guided (e.g., by suitable grouping of text lines or by using a spacing of one-and-a-half lines). If this is not possible, e.g., in the case of lists and tables with larger gaps within the line, suitable visual guides shall be provided to lead the eye (e.g., larger line spacing, horizontal auxiliary lines, grouping of lines).

(3) The lines of lists and tables shall be grouped in thematic units. The individual groups shall be separated from each other by visual guides (cf. para. 2).

(4) Prose texts shall be used sparingly and shall be written in a comprehensible style. With respect to comprehensibility, it is recommended

a) to use precise, concrete and commonly used words,

b) to formulate short and simple sentences,

c) to avoid negative and passive statements and nominalizations,

d) to place numbered items at the end of sentence, and

e) to use identical words and similar sentence structures for similar factual circumstances.

4.5 Markings and Accentuations

(1) If individual text passages must be marked to accentuate differing degrees of importance, this shall, preferably, be done by typographic means. The various markings specified in para. 2 shall be used uniformly and sparingly and shall not be superposed on each other.

(2) If individual words or word groups need to be accentuated, the following means may, e.g., be used

a) bold letters,

b) italicized letters,

c) underlining,

d) different fonts,

e) different font sizes, or

f) capital letters.

(3) In addition to the accentuation of larger text passages by textual structuring (cf. Section 4.3) and marking individual words and word groups (cf. para. 2), the following accentuation means shall, mainly, be used:

a) positive and negative indentations,

b) border frames, and

c) margin border markings.

4.6 Terms and Abbreviations

(1) All terms used shall be unequivocal and as short as possible. The same object, person, denotation, etc., shall always be identically named by the same term.

(2) Different objects or circumstances (e.g. activities, conditions, components) shall be named using correspondingly different terms.

Note:

It should, thus, be prevented that one and the same term is used with different meanings. For instance, the word "opened" should always characterize the condition and “(to) open" the activity for achieving that condition.

(3) In the operating manual, the systems and components shall be identified by their respective full length name and, additionally, by their codification according to the identification code valid in the power plant.

(4) In the operating manual, the same terms and abbreviations shall be used as on-site within the plant. Only one abbreviation shall be specified for the individual term. Each abbreviation shall have only one meaning.

(5) Differences in meaning shall not depend alone on the text being written in small or in capital letters.

4.7 Procedural Instructions and Directives

(1) All actions of the personnel (e.g., controls, switching operations, communication procedures) shall be unambiguously specified in (written) procedural instructions.

(2) Procedural instructions shall be written and arranged to be in accordance with their particular purpose.

(3) Procedural instructions shall be self-explanatory without having to check on other information sources outside of the operating manual.

(4) Procedural instructions shall be formulated in the imperative form.

(5) Provided, the specifics of their particular purpose so allow (cf. para. 2), the procedural instructions, particularly those regarding operation of the overall plant and of individual systems, shall be arranged in sequential steps that, in their logical and chronological order correspond to the sequence of the particular procedure (step programs).

(6) Individual steps shall name the task to be performed and the object concerned as well as the particular boundary conditions (e.g. specification of the location). They may encompass multiple actions. The prerequisites shall be presented in advance of the individual step and such that only a single step procedure is mandatory. Steps may be suitably arranged together in blocks of tasks, e.g. with resgard to hold points or intermediate goals.

(7) The presentation of step programs may employ graphic and typographic means.

(8) Those parts of the operating manual which, as copies, are used as check lists shall be structured such that space is provided for completion checkmarks.

(9) Directives giving context related advice and support shall be used sparingly; they shall not replace step instructions, nor shall they be used for distinguishing between different cases nor for jump instructions to different sections.

4.8 Flow Charts and Other Graphic Elements

(1) Any graphic presentations of instructions or procedures shall, preferably, be in the form of flow charts.

The number of differently designed graphic elements shall be kept at a minimum. The graphic forms shall be kept simple. Whenever a graphic element (e.g., the rhombus, ◊) is associated with a contextual meaning, said meaning shall be specified and uniformly employed throughout.

Any meaning behind colors shall be defined and uniformly employed throughout. In choosing the colors to be employed, it shall be ensured that they remain visible when copied, even in black-and-white copies.

(2) Graphic elements with different contextual meanings shall be differentiated by the use of different forms. A variation of line type, typography, color or pattern alone is not sufficient.

(3) Graphic elements for step instructions, so-called action blocks, shall be marked by unambiguous alpha-numeric identifiers. These identifiers serve to identify the action blocks within the flow charts as well as within the sections containing the associated detailed descriptions. The textual formatting as well as the depth of information of the graphic elements (e.g., within an action block, or in case of directives) shall be specified and uniformly employed throughout.

(4) Locations of jump instructions within flowcharts shall be marked by unambiguous connectors (“to …”, “from …”). The connectors shall be uniformly employed throughout. It is not permissible to characterize different paths and connectors alone by their color or pattern. The meaning behind a color or pattern coding shall always be supplemented by a textual description (e.g., “Case A”).

4.9 Safety Specifications

All parts within the operating manual characterized as being safety specifications shall be set off from the other parts in a form that will not be lost when copied (e.g. by the word "Safety Specification" or its abbreviation "SSp" on the respective page).

5 Requirements Pertaining to the Operating Manual, Part 0 – Table of Contents and Introduction

(1) All parts and associated chapters of the operating manual shall be listed in a table of contents. Those chapters that are part of the safety specifications shall be properly marked.

(2) An additional chapter should be included which should contain an introduction to the operating manual. This should present a general overview of the structure of the operating manual. It should give a short description of the contents of the individual chapters. Selected examples should be used for describing the general layout of procedural instructions and data queries, as well as of signal and alarm displays, etc.

(3) A compilation of the abbreviations, graphic elements, special spellings and definitions that, generally, apply to the operating manual shall be contained in this part of the operating manual.

(4) Explanations of discipline-oriented abbreviations, spellings and definitions shall be assigned to the respective chapters.

6 Requirements Pertaining to the Operating Manual, Part 1 – Plant Regulations

6.1 General Requirements

The plant regulations listed under Section 3.1 para. 3 shall be included in the operating manual and shall be named with the identical terminology as specified. Essentially, they shall specify the objectives and the regulatory provisions, the organizational framework and responsibilities and, as required, shall reference applicable regulations. In as far as this is not contained in Personnel Organization, the responsibilities and essential details

of the specified organizational framework shall be supplemented in the individual plant regulations listed under Section 3.1 para. 3.

6.2 Personnel Organization – SSp

(1) All persons whose names must be reported by the licensee to the licensing or supervisory authority, in particular, with regard to meeting the requirements of Sec. 7 para. 2 no. 1 AtG and of the Radiological Protection Ordinance, shall be listed by name.

(2) For each of the named persons, their competence, their field of activity, their area of responsibilities as well as their authority to issue directives shall be specified. In this context, all safety-related fields of activities shall be taken into consideration; these are, in particular:

a) General responsibilities and competence under nuclear regulations for
   aa) specified normal operation and design basis accidents (incidents) and any deviating specifications for emergencies,
   ab) maintenance,
   ac) modifications of the plant and amendments and changes of operating documents,
   ad) achieving and maintaining technical qualification, and
   ae) reporting of notifiable events in accordance with Ordinance AtSMV.
b) Specific responsibilities and competence of the persons authorized in the areas of
   ba) nuclear safety,
   bb) radiation protection,
   bc) management system,
   bd) plant security,
   be) IT-security.

(3) The personnel organization shall be shown schematically in an organization chart.

Note:

The specification regarding number, expertise and levels of knowledge for the other working personnel can be contained in other documents.

6.3 Control Room and Shift Regulation – SSp

The following points shall be specified in the Control Room and Shift Regulation:

a) minimum staffing of the shift group and minimum staffing of the control room specifying the required qualification (e.g. shift supervisor) of the shift personnel,
b) requirements regarding changing-of-the-shift procedures,
c) requirements regarding the keeping of the shift log,
d) procedure in the case of contradictory displays and alarms,
e) requirements regarding the administration of keys relevant to safety,
f) type and extent of the documents required for plant operation that must be kept available in the area of the control room as well as the required documentation of plant operation in accordance with safety standard KTA 1404,
g) requirements regarding the performance of shift duty,
h) procedure in case of necessary deviations from the operating manual.

6.4 Maintenance Regulation - SSp

6.4.1 General requirements

The Maintenance Regulation shall be structured to meet the requirements specified in the applicable regulations and guidelines, e.g. Maintenance Guideline, Guideline IWRS II, BGV A 1, BGV C 14, BGV C 16 and safety standard KTA 1401.

6.4.2 Procedure for the planning and execution of tasks regarding maintenance and technical modifications

The procedure shall be specified encompassing all steps starting with the initial reason for the maintenance task or technical modification, continuing with work preparation, release switching, simulation, work release, work performance, notification of work completion, normalization, final testing and reestablishment of operational readiness.

6.4.3 Documentation

The procedure for the documentation of maintenance measures and findings with regard to safety-related systems and components shall be described.

6.5 Radiation Protection Regulation - SSp

6.5.1 General requirements

(1) The Radiation Protection Regulation shall meet the requirements for the radiation protection instruction in accordance with Sec. 34 StrlSchV. The individual measures specified in Sec. 34 StrlSchV shall be itemized, however, a reference to other operating regulations (e.g., Alarm Regulation) is permissible.

(2) In preparing the Radiation Protection Regulation, safety standard KTA 1301.2 and the requirements of applicable regulations, e.g., REI Guideline and IWRS II Guideline, shall be taken into consideration.

6.5.2 Radiation protection organization

(1) The radiation protection organization shall be described. The duties of the radiation protection supervisor shall be specified. The radiation protection commissioners appointed in accordance with Sec. 31 para. 2 StrlSchV, their delegated tasks and responsibilities and their plant-internal jurisdiction shall be specified.

(2) All functions of the radiation protection commissioners that reach over into other technical areas shall be clearly recognizable and shall be clearly presented. Their cooperation with the experts on occupational safety in accordance with Sec. 32 para. 4 StrlSchV as well as with the person responsible for fire protection shall be described.

6.5.3 Specification and monitoring of radiation protection areas

(1) The duties with regard to installing and monitoring the radiation protection areas of the plant shall be specified.

(2) With regard to the controlled areas, the exclusion areas and the monitored plant area, the following shall be specified:

a) right of access,
b) access and exit procedures, and
c) personal conduct.

(3) For those plant areas, measures shall be specified by which it is ensured that the Radiological Protection Ordinance is adhered to.

6.5.4 Monitoring of persons

The duties with regard to radiation protection monitoring of plant personnel and of contract personnel with access rights for the controlled areas shall be specified and described taking the Radiological Protection Ordinance into account.

6.5.5 Plant and environmental monitoring

(1) The duties with regard to plant and environmental monitoring shall be specified taking, in particular, the Radiological Protection Ordinance and the REI Guideline into account (e.g., measurement and evaluation of the local doses or local dose rates in radiation protection areas, of the radioactivity concentrations in the room atmosphere and exhaust air, of the contamination of work places and material objects, of the radioactivity discharged with air, of the radioactivity discharged with water, of the radioactivity and local dose in the environment).

(2) The measures regarding tests, calibrations and servicing of the measurement equipment for plant and environmental monitoring shall be specified.

6.5.6 Storage and handling of radioactive materials and contaminated objects

(1) The procedures for the storage and handling of radioactive materials and contaminated objects shall be specified taking, in particular, the Radiological Protection Ordinance and safety standards KTA 3602 and KTA 3604 into account (e.g., transportation of objects out of the controlled areas; storage and handling of radioactive materials, of fuel assemblies, of spent fuel shipping casks; intermediate storage and transfer of radioactive materials; decontamination of objects; protection against loss of radioactive materials).

(2) With regard to radioactive waste and residual materials the following shall, in particular, be described; the organization, material flow, collection and sorting, packaging and transport; the radiological measurements, identification markings, documentation and the reporting procedure; the storage conditions, pretreatment, repackaging and conditioning; the clearance procedure and the procedures for transfer, handover and return transfer of these materials.

Note:

Should the volume of material under this paragraph become too large, an individual Waste and Residual Material Regulation may be introduced.

6.5.7 Administration of the radiation protection documentation

Type, extent and storage period of the radiation protection documentation shall be specified taking the Radiological Protection Ordinance and safety standards KTA 1301.2 and KTA 1404 into account.

6.6 Guard and Access Regulation – SSp

(1) The administrative measures regarding the procedures for access, stay and exit of persons and of bringing in and removing physical objects shall be specified. These are, in particular:

a) access authorization and regulations for personal conduct, differentiated according to the different groups of persons (e.g. plant personnel; contract personnel; members of nuclear supervisory authorities, of technical expert organizations and of contractors and subcontractors; visitors),

b) identification pass system (ranges of validity, different groups of persons),

e) chain of command, duties and authorization of the security personnel.

(2) Any measures subject to strict secrecy shall be specified outside of the operating manual in plant-internal guidelines.

6.7 Alarm Regulation – SSp

6.7.1 General requirements

(1) The Alarm Regulation shall comprise, in a clearly structured manner, measures and rules of conduct for the persons on the power plant site in case of events that could be dangerous to these persons, to the environment of the plant, or to the power plant itself.

(2) In preparing the Alarm Regulation, the Radiological Protection Ordinance and the criteria for issuing alarms in accordance with Criteria for Alarming the Catastrophe Protection Authority shall be taken into account.

(3) The extent and frequency of alarm drills (alarm test, personnel training) as well as the rescue routes and collecting points shall be specified.

6.7.2 Responsibilities and standby service

(1) The persons shall be named who are functionally responsible for initiating alarms, for carrying out the measures required in case of an alarm as well as for notifying and advising the proper authorities and aid organizations.

(2) Reference shall be made to the standby duty plan containing the names, functions and telephone numbers of all plant personnel that must be notified for active duty in the event of an alarm.

6.7.3 Notification, alarm signals, rules of conduct

(1) The notification procedure, including verification of the report, shall be described. It shall be emphasized that the report must include information regarding the location and type of occurrence, the name and telephone number of the reporting person as well as the time of the report ("where, what, who, when").

(2) The triggering criteria, the alarm procedures, the signal sequences as well as the rules of conduct for the personnel shall be specified for all plant-internal alarms (serious personal accident, fire alarm, evacuation alarm, escape alarm). Safety standard KTA 3901 shall be taken into account.

(3) With respect to plant-external alarms (early-warning alarm, catastrophe alarm) the triggering criteria, the alarm procedures, the communication lines and the co-operation with the competent circles of people shall be specified.

6.7.4 Documentation of Alarms and Alarm Drills

Type, extent and storage period of the required documentation of alarms and alarm drills shall be specified.

6.8 Fire Protection Regulation – SSp

6.8.1 General requirements

The Fire Protection Regulation shall contain the descriptions of the preventive and defensive fire protection measures. These shall be based on the applicable regulations and standards (e.g. safety standard KTA 2101.1, DIN 14 096-3).

6.8.2 Fire Protection Organization

The organization of the plant-internal fire brigade and of the personnel trained in fire protection shall be specified with special regard to

a) structural and procedural organization,

b) personnel qualification,

c) boundary conditions regarding standby duty, and

d) cooperation with external fire brigades.

6.8.3 Fire Prevention

As precautionary measures with regard to preventive fire protection, the basic requirements shall normally be specified for the:

a) measure for keeping the amounts of combustible materials within the design basis limits,

b) measures for minimizing the amounts of combustible materials,

c) measures to be taken in case no fire alarm and fire fighting equipment and no structural fire protection is available, and

d) measures to be taken in case of work tasks involving an increased fire hazard.

6.8.4 Procedures and responsibilities in case of fire

The procedures and responsibilities in case of fire shall be specified with special regard to

a) notification,

b) alarming, and

c) fire fighting.

6.8.5 Miscellaneous

The following shall also be specified:

a) fire fighting drills, and

b) type of documentation of the fire fighting drills and activities.

6.9 First-Aid Regulation – SSp

The First-Aid Regulation shall contain the descriptions of the following points, taking BGV A 1 as well as BGI 668 into account:

a) Responsibility and competence of the

   aa) person giving the alarm,

   ab) shift supervisor,

   ac) first-aiders / plant-internal medic,

   ad) radiation protection commissioner, and

   ae) security engineer,

b) Alarm and notification concept (cf. Section 6.7), and

c) Procedure in case of personal accidents involving a suspected contamination or incorporation.

7 Requirements Pertaining to the Operating Manual, Part 2 - Plant Operation

7.1 Pre-requisites and Conditions for Operation - SSp

This section shall contain:

a) All operating-condition independent and temporally unlimited provisions and conditions by the proper authorities concerning plant operation with regard to nuclear law, water law, building law, immission protection law, and work protection law in as far as nuclear safety is concerned.

   The resulting requirements shall also be incorporated in the corresponding parts of the operating manual or other instructions.

   Formal proceedings with regard to maintenance (implementation of provisions and conditions by the proper authorities) shall be specified unless this has already been specified in the Maintenance Regulation.

   Note:

   The specifications with respect to the provisions and conditions by the proper authorities concerning modification procedures can be part of the operating manual or they can be contained in an individual regulation (e.g., Modification Regulation).

b) Procedural pre-requisites, safety-related limit values and conditions regarding power operation.

c) Permissible period of unavailability for systems and plant components required for incident (cf. Section 2, (8)) management and the measures to be taken in case these permissible periods are exceeded or in case it is foreseeable that they will be exceeded.

d) Specifications regarding preventive maintenance of safety-related systems and plant components during power operation; they shall also include specifications of the boundary conditions, of the range of validity and the prerequisites.

e) Specifications regarding the performance of short-term transferability tests on account of notifiable events, information notices, or other relevant findings.

f) For each operation phase of the no-power operation, the required availabilities (minimum required availabilities) of safety-related systems and plant components required for incident (cf. Section 2, (8)) management, as well as the possibly required measures to be taken in case of infringements of the minimum required availabilities.

g) Specification of the availability parameters for the components of safety-related systems required for incident (cf. Section 2, (8)) management (e.g., levels in flooding tanks, pressures in hydraulic accumulators, boron concentration in the borated water storage tanks). The unavailability of these systems shall be determinable in an unambiguous way from the availability parameters and their reliable surveillance. In well substantiated cases (e.g., pump flow rates, travel times of valves), the availability parameters may be presented in other parts of the operating manual or in other documents (e.g., testing instructions). In these cases the operating manual shall contain a reference to these documents. On the basis of these documents it must be possible to assess possible restrictions of the availability from the availability parameters.

   Note:

   The availability parameters describe relevant conditions for the designated function of safety-related systems and plant components required for incident (cf. Section 2, (8)) management.

h) Process-engineeringl pre-requisites, safety-related limit values and conditions for the various procedures of no-power operation.

i) Procedures of no-power operation subdivided

   Note:

   A possible subdivision would be

   for the PWR

   1 from the moment of permanent sub-criticality until cooling begins via the secondary loop

   2 until cutting-in of the residual heat removal system

   3 until reduction of the filling level of the primary circuit begins

   4 until the pressure tight closure of the reactor pressure vessel begins to be undone, and opening of the primary loop begins

   5 until pulling of the refueling slot gate begins

   6 until lowering the refueling slot gate to the lower edge of the loop (after unloading of the fuel assemblies) begins

   7 until pulling the refueling slot gate for the purpose of refueling begins

8 until lowering the refueling slot gate after refueling to the mid-level of the loop begins

9 until the start of reestablishing the pressure tight closure of the primary circuit

10 until increasing the filling level of the primary circuit begins

11 until heating of the primary circuit to higher than 120 °C with the reactor coolant pumps begins

12 until criticality is reached with the goal of beginning the power production

for the BWR

1 from the moment of criticality until clearance is given for the cooing down operation

2 closed reactor pressure vessel, from the moment on of clearance having been given for the cooling down operation

3 opened reactor pressure vessel being loaded with fuel assemblies

4 pulling of the first control rod until criticality is reached with the goal of the beginning the power production

7.2 Safety-related Limit Values – SSp

This section shall contain all immediately self-signaling limit values that are recorded in the control room and

a) that are processed by the reactor protection system (reactor protection limit values),
b) that are processed by the restriction system (e.g., restriction limit values)
c) that serve to protect the persons in the plant (e.g. radioactivity limit values with regard to monitoring the coolant circuits and room atmosphere, as well as the local dose rate limit values),
d) that indicate an increased release of radioactive materials (e.g. radioactivity limit values with regard to monitoring stack discharge and liquid discharge),
e) that are hazard alarms in accordance with safety standard KTA 3501 (Class S Alarms) intended to alert the shift group to manually initiate protective actions in case of design basis accidents (incidents),
f) that are hazard alarms in accordance with safety standard KTA 3501 (Class I Alarms) intended to alert the shift group to take corrective actions in case of malfunctions in the safety system.

It is permissible to refer to Part 5 of the operating manual (cf. Section 10).

7.3 Testing Schedule - SSp

A testing schedule shall be included in the operating manual which shall list the inservice inspections, at least, for the safety-related systems and plant components.

N o t e :

The requirements for the testing schedule are specified in safety standard KTA 1202.

7.4 Criteria for Notifiable Events - SSp

This section shall contain the criteria for notifiable events in accordance with Ordinance AtSMV, and shall contain the associated explanations and, if applicable, plant specific information.

7.5 Normal Operation

(1) This section shall contain the procedural instructions for power operation and all operating phases of no-power operation with the systems in functioning order, and shall include descriptions of the interactions of systems and subsystems.

(2) The procedural instructions shall start out from clearly defined initial conditions (operating conditions of the systems or auxiliary systems). They may be supplemented by graphic overviews, by checklists and diagrams.

(3) To verify the minimum required availabilities for the safety-related systems and plant components, checklists (or comparable documents) shall be provided for each change of operating phase (e.g., for the startup of the plant).

7.6 Abnormal Operation

(1) This section shall contain, for all cases of abnormal operation to be considered, those measures which are automatically initiated as well as those measures which must be manually initiated by the shift group. The description of the measures shall start out from clearly defined initial conditions.

(2) The cases of abnormal operation to be considered for power operation shall be contained in this section and, if necessary, also the cases of abnormal operation during no-power operation.

(3) Documents shall be prepared for the individual cases of abnormal operation that, in a clear and as concise a form as possible (so-called “concise version”), shall contain the following information:

a) criteria for identifying the individual case of abnormal operation,

Note:

These may also be directives regarding auxiliary means that can help regarding details for the identification and clarification of upset plant conditions as well as with a corresponding decision support.

b) specification of the automatically proceeding safety-related measures,
c) specification of the essential measures that must be manually initiated by the shift group,
d) details with respect to monitoring the effectiveness of measures, including a list of plant parameters whose values shall not change and must, therefore, be particularly monitored, and
e) the condition of the power plant that shall be achieved and in which it shall be maintained.

(4) The documents under para. 3 shall be marked as safety specifications.

(5) The documents under para. 3 shall, if necessary, be supplemented by detailed descriptions of the required measures (so-called “detailed version”).

(6) Other parts of the operating manual may be referred to, both, in the concise version and the detailed version.

8 Requirements Pertaining to the Operating Manual, Part 3 – Design Basis Accidents (Incidents)

(1) This part of the operating manual shall be used to describe the protective goals.

(2) The measures automatically initiated in case of design basis accidents (incidents) shall be specified, as well as those that must be manually initiated by the shift group.

(3) The design basis accidents (incidents) that must be considered for power operation and for no-power operation shall be covered in this part.

(4) The following procedures for the control and mitigation of design basis accidents (incidents) are permissible:

a) the condition-oriented (protective-goal oriented) handling of design basis accidents (incidents),

b) the event-oriented handling of design basis accidents (incidents).

The condition-oriented (protective-goal oriented) procedure may be used alone but also in combination with the event-oriented procedure.

(5) A procedure shall be prescribed (e.g. Incident Decision Guide) that can be used in deciding

a) which of the two procedures shall be applied, and in which way, whenever a design basis accident (incident) occurs,

b) how the transition from the event-oriented to the condition-oriented chapter of the operating manual shall be made in the course of a design basis accident (incident),

c) how the transition to emergency measures (i.e., from the operating manual to the emergency manual) shall be made whenever the protective goal cannot anymore be maintained.

(6) The condition-oriented (protective-goal oriented) chapters of the operating manual shall contain:

a) a description of the individual protective goals to be maintained and of the all protective goals encompassing auxiliary functions,

b) a procedural strategy for maintaining the protective goals,

c) a specification of concrete measures, including the systematic procedural steps to be followed and the specification of the minimum effectiveness of these measures,

d) details with respect to monitoring the effectiveness of measures, including a list of plant parameters whose values shall not change and must, therefore, be particularly monitored,

e) a description of the transition process from the operating manual to the respective emergency measures. The criteria for the transition to the emergency manual shall not be identical to those criteria regarding the transition to the protective-goal oriented chapters of the operating manual.

(7) The event-oriented chapters of the operating manual shall contain documents prepared for the individual plant conditions or events that, in a clear and as concise a form as possible (so-called “concise version”), shall contain the following information

a) criteria for identifying the plant condition or the event,

Note:

These may also be directives regarding auxiliary means that can help regarding details for the identification and clarification of design basis accidents (incidents) as well as with a corresponding decision support (e.g., Incident Decision Tree).

b) specification of the automatically proceeding safety-related measures,

c) specification of the essential measures required for the control and mitigation of the design basis accident (incident) that must be manually initiated by the shift group, and

d) details with respect to monitoring the effectiveness of measures, including a list of plant parameters whose values shall not change and must, therefore, be particularly monitored.

(8) Both, the condition-oriented chapters and the event-oriented chapters of the operating manual shall contain descriptions of the power plant condition that must be achieved and in which the plant must be kept.

Note:

The plant conditions to be achieved shall be specified in such a way that the shift group can check the effectiveness of their measures and can detect any deviations.

(9) The documents under paras. 6 and 7 shall, if necessary, be supplemented by detailed descriptions of the required measures (so-called “detailed version”).

(10) Other parts of the operating manual may be referred to, both, in the concise version and the detailed version.

(11) The documents under paras. 5 through 8 are part of the safety specifications.

9 Requirements Pertaining to the Operating Manual, Part 4 - Systems Operation

(1) This part shall contain the procedural instructions for the operating procedures of all systems (e.g. start-up, operation, shut-down, switch-over). Several systems may be dealt with collectively, depending on the operational requirements.

Note:

Collective procedural instructions are, among others, those instructions specified with regard to securing barrier integrity, e.g., especially in the phases of no-power operation, with regard to opening and closing the reactor safety vessel and to containment isolation.

(2) The procedural instructions shall start out from clearly defined initial conditions (e.g. initial positions or operating conditions of components or auxiliary systems) and shall normally, if possible, contain criteria for monitoring the effectiveness of these measures. They may be supplemented by graphic overviews, by diagrams and special references.

Note:

Supplementing documents for no-power operation are, e.g., lists showing the positions of the terminal point valves leading to systems carrying demineralized water.

(3) The fuse schematics for the safety-related components shall be included. These shall depict the values for normal operation, the preliminary and the triggering limit values and, likewise, the safety-related limit values specified under Sections 7.1 and 7.2.

(4) The handling of fuel assemblies, core components and heavy loads shall be described. The detailed procedural steps may be presented in separate documents that shall be referenced in the operating manual.

10 Requirements Pertaining to the Operating Manual, Part 5 – Malfunction and Hazard Alarms

All malfunction and hazard alarms and the corresponding automatically or manually initiated measures shall be presented in a system-oriented collation. The alarm systems (e.g. computer), and the control stations where the alarms will register shall be specified.

11 Requirements Pertaining to the Operating Manual, Appendix

(1) The appendix of the operating manual shall contain listings of all documents relating to the licensing procedure and to the operation of the plant.

(2) The appendix shall normally contain at least

a) a list of those licensing documents that were the basis for the safety-related appraisal of the plant as well as for the construction permit and operating license of the plant, or for the provisions by the competent authorities,

b) the safety-related limit values specified under Section 7.2 including a reference to the associated documents that were the basis for the nuclear physical, thermohydraulical and process engineering design analyses and the documents with the respective results, and here, in particular, the limit values derived from the design basis accident (incident) analyses, and

c) listings of documents and supplemental regulations that cannot be correlated to Sections 6 through 10, the contents

of which, however, is relevant to plant operation (e.g., Handbook of Chemistry) and, therefore, requires regular updating.

12 Updating Procedure

(1) An updating procedure shall be specified and installed to ensure that the operating manual is up-to-date at all times. It shall be ensured

a) that changes of any circumstances that are relevant to safety and that are a part of the operating manual are transferred without delay at least to the operating manuals in the control room and in the remote shutdown station as well as to its parts in the local control stations,

b) that all system specific data are in full conformance with those cited in the system diagrams and system descriptions,

c) that editorial mistakes (e.g. incorrect spelling, wrong acronyms) are corrected,

d) that a register is kept of the state of modification of each of the individual pages,

e) that all changes of the operating manual can be traced back to the original.

(2) Any changes of data contained in the safety specifications require the consent of the competent licensing or supervisory authority.

(3) An exchange procedure shall be arranged with the users of registered copies of the operating manual (e.g. frequency of exchange, feedback, postal address).

13 Location of the Operating Manual

(1) Of the operating manuals, one shall be kept at least in the control room and one in the remote shutdown station.

(2) The appendix of the operating manual shall be kept in the control room or in the control room annex.

Appendix

Regulations 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 307 of the Ordinance of August 31, 2015 (BGBl. I 2015, No. 35, p. 1447)
StrlSchV		Ordinance on the protection against damage and injuries caused by ionizing radiation radiological protection ordinance - StrlSchV) of July 20, 2001 (BGBl. I 2001, No. 38, p. 1714), last revised by Article 5 of the Ordinance of December 11, 2015 (BGBl. I, p. 2010, 2011)
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)
AtVfV		Ordinance on the procedure for licensing of installations under Sec. 7 of the Atomic Energy Act (Nuclear licensing procedure ordinance - AtVfV) of February 18, 1977 (BGBl. I p. 280), last revised by Article 4 of the Law of December 9, 2006 (BGBl. I p. 2819)
SiAnf	(2015-03)	Safety Requirements for Nuclear Power Plants, in the new version promulgated on March 3, 2015 (BAnz AT March 30, 2015 B2)
Interpretations to SiAnf	(2015-03)	Interpretations to the Safety Requirements for Nuclear Power Plants of November 22, 2012; revised on March 3, 2015 (BAnz AT March 30, 2015 B3)
Maintenance Guideline	(1978-06)	Guideline relating to the procedure for the preparation and implementation of maintenance work and modifications at nuclear power plants of June 1978 (GMBl 1978, p. 342)
IWRS II Guideline	(2005-01)	Guideline for the radiation protection of personnel during the execution of maintenance work in nuclear power plants with light water reactors; Part II: Radiological protection measures during commissioning and operation of the plant – IWRS II of January 17, 2005 (GMBl 2005, No. 13)
REI	(2005-11)	Guideline on the monitoring of emissions and immissions of nuclear facilities (REI) of December 7, 2005 (GMBl 2006, No 14-17, p. 253)
Criteria for Alarming the Disaster Control Authorities		Criteria for alarming the disaster control authorities by the operators of nuclear facilities; recommendations by the RSK and SSK, 386th session of the RSK and 186th session of the SSK (BAnz 204, No. 89)
KTA 1301.2	(2014-11)	Radiation protection considerations for plant personnel in the design and operation of nuclear power plants Part 2: Operation
KTA 1402	(2012-11)	Integrated Management Systems for the Safe Operation of Nuclear Power Plants
KTA 1404	(2013-11)	Documentation during the construction and operation of nuclear power plants
KTA 2101.1	(2015-11)	Fire protection in nuclear power plants; Part 1: Basic requirements
KTA 3501	(2015-11)	Reactor protection system and monitoring equipment of the safety system
KTA 3602	(2003-11)	Storage and handling of fuel assemblies and associated items in nuclear power plants with light water reactors

KTA 3604	(2005-11)	Storage, handling, and plant-internal transport of radioactive substances in nuclear power plants (with the exception of fuel assemblies)
KTA 3901	(2013-11)	Communication means for nuclear power plants
DIN 1421	(1983-01)	Outlines and numbering of texts; sections, paragraphs, enumerations
DIN 1422-1	(1983-02)	Publications in science, technology, economics and administration; layout of manually and type written scripts
DIN 14096	(2014-05)	Fire precaution regulation - Part 3: Part C (for persons with special tasks of fire prevention and fire fighting); rules for drafting
BGI 668	(2006)	First aid in the case of increased influence of ionizing radiation; First-aid memorandum published by the Main Association of Professional Trade Unions
BGV A1	(2009-01)	Accident Prevention Regulation; Principles of Prevention; of January 1, 2008 (formerly VGB 1)
BGV C16	(1997-01)	Accident Prevention Regulation; Nuclear Power Plants; of January 1, 1987; with application instruction of January 1, 1999 (formerly VGB 30)