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I.

Draft

IMPLEMENTING DECREEof ….2017on the requirements for nuclear installation design

In accordance with § 236 of Act No 263/2016, the Atomic Act, and in order to implement § 24(7), § 44(4)(a) and (b), § 45(4) and § 46(8), the State Office for Nuclear Safety lays down the following:

PART ONE

GENERAL PROVISIONS

§ 1

Subject matter

This Implementing Decree incorporates the relevant Euratom legislation1) and governs

a) the requirements for the contents of documentation for licensed activities,
b) the list of safety functions that must be performed by nuclear installations and classification of the functions into categories according to their relevance to nuclear safety,
c) safety classes and the criteria for classifying selected equipment into these classes,
d) the method of ensuring defence-in-depth, and
e) the content of the requirements for nuclear installation design referred to in § 46(1), (2)(a), (b), (e), (g), (i), (k), (l), and (m), and (3) of the Atomic Act.

Definitions

§ 2

For the purposes of this Implementing Decree, the following definitions shall apply

a) ‘practically excluded event’ means a condition, state or incident, the occurrence of which is considered physically impossible or which are, with a high degree of plausibility, very unlikely,
b) ‘state of a nuclear installation’ means the conditions which a nuclear installation may encounter in the course of its life-cycle,
c) ‘safe state of a nuclear installation’ means the state of a nuclear installation, in which compliance with the principles for the safe use of nuclear energy referred to in § 45(2) and (3) of the Atomic Act (hereinafter ‘basic safety functions’) is ensured on a long-term basis,
d) ‘normal operation’ means the state of a nuclear installation, in which the limits and conditions are adhered to,

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1) Council Directive 2009/71/Euratom of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations.
Council Directive 2014/87/Euratom of 8 July 2014 amending Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations.

e) ‘abnormal operation’ means the state of a nuclear installation deviating from normal operation, which is expected to occur, does not cause any significant damage to systems, structures and components relevant to nuclear safety and after which the nuclear installation is capable of normal operations without repair,
f) ‘operational state’ means the state of a nuclear installation, which is either normal operation or abnormal operation,
g) ‘accident conditions’ mean a state of a nuclear installation, which is not an operational state,
h) ‘design basis accident’ means accident conditions in the event of which the correct functioning of safety systems ensures that the corresponding reference levels or exposure limits are not exceeded,
i) ‘postulated initiating event’ means a deviation from normal operation, which is random, anticipated and included in the design basis and the development of which may lead to abnormal operation or accident conditions,
j) ‘scenario’ means a combination of events more severe than postulated initiating events for abnormal operation and design basis accidents,
k) ‘design extended conditions’ mean accident conditions triggered by scenarios taken into account in nuclear installation design,
l) ‘severe accident’ means accident conditions involving serious damage to nuclear fuel either due to serious damage to and irreversible loss of the structure of the core of the nuclear reactor (hereinafter referred to as the ‘core’) or the system for storing nuclear fuel due to damage to fuel assemblies as a result of melting of nuclear fuel,
m) ‘elementary design basis’ means the design basis which, if complied with or not exceeded, ensures that no event more serious than a design basis accident will occur,
n) ‘safety system’ means the system designed to ensure reliable performance of the basic safety function in the event of abnormal operation or a design basis accident,
o) ‘active function of a system, structure or component’ means the function of a system, structure or component, which requires activation, mechanical propulsion or supplies of a medium or energy from another system in order to be performed,
p) ‘passive function of a system, structure or component’ means the function of a system, structure or component, which does not require activation, mechanical propulsion or supplies of a medium or energy from another system in order to be performed, and
q) ‘safety limit’ means the limit value of a parameter characterising the state of a nuclear installation or other representation of a safety, technical or administrative condition beyond which nuclear safety, radiation protection or technical safety is jeopardised as a result of a failure of a system, structure or component.

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§ 3

For the purposes of this Implementing Decree, the following definitions shall apply

a) ‘conservative approach’ means the method of assessing, by means of expert estimates or statistical evaluation, the impact of the uncertainties of knowledge, input data and methods and models used in such a manner that the result of the assessment of the item under consideration includes the least favourable plausible variants,
b) ‘realistic approach’ means the method of assessing, by means of expert estimates or statistical evaluation, the impact of the uncertainties of knowledge, input data and methods and models used where the result represents the most likely variant,
c) ‘safety margin’ means the value expressing the difference between the safety limit and the acceptance criterion established using the conservative approach,

d) ‘environment qualification’ means the ability of a system, structure or component to meet the requirements set out by technical specifications for its function in the working environment and in conditions triggered by the characteristics of the area for siting the nuclear installation (hereinafter referred to as ‘area characteristics’),
e) ‘fuel element’ means nuclear material hermetically sealed by a cladding,
f) ‘fuel assembly’ means the set of fuel elements loaded into the nuclear reactor as a single unit and enabling the handling of nuclear fuel as set out in the nuclear installation design,
g) ‘fuel system’ means the set of fuel assemblies specified in the nuclear installation design and other components of the core needed to control reactivity and maintain the design structure of fuel assemblies in the core,
h) ‘single failure’ means an event which results in the loss of capability of a system, structure or component to perform its intended function, while the functions of other systems, structures and components are maintained;subsequent failures within the same system resulting in the loss of capability of another structure or component to perform their intended functions caused by single failure shall be considered part of this single failure,
i) ‘common-cause failure’ means the failure or malfunction of several systems, components, structures by the action of a common cause, which leads to the loss of their safety functions,
j) ‘postulated multiple failure’ means the expected concurrent failure or malfunction of several systems, structures or components leading to the loss of their safety functions,
k) ‘fuel element disruption’ means the disruption of the hermetic cladding of the fuel element making the release of a radioactive substance from the fuel element possible,
l) ‘design limit’ means the acceptance criterion used to assess the capability of a nuclear installation to perform its function as intended in the nuclear installation design;design limit is, in particular, a limit set out by legislation or an acceptance criterion derived therefrom, which corresponds to the method of assessment of the capability of the nuclear installation to perform its function as intended in the nuclear installation design,
m) ‘stabilised subcritical state’ means a stabilised state of a nuclear installation achieved in abnormal operation and under accident conditions by the action of systems specified by the nuclear installation design, in which the nuclear reactor is subcritical and basic safety functions are ensured for the period needed to apply measures to bring the nuclear installation into a safe state,
n) ‘control and management system’ means the systems, structures and components used for measuring, evaluating and displaying the nuclear installation parameters for the needs of the nuclear installation operators and for nuclear installation control, including start-up and management of interventions necessary to ensure nuclear safety, radiation protection, radiological emergency management and security,
o) ‘containment system’ means the systems, structures and components intended in the nuclear installation design to prevent the propagation of ionising radiation and release of radioactive substances from the nuclear reactor and to protect the nuclear reactor against the action of area characteristics and external threats,
p) ‘diversion means’ mean the system, structure, component or organisational measure to ensure or substitute a safety function in the event of a loss thereof due to a common-cause failure,
q) ‘alternative means’ mean the system, structure, component or organisational measure to manage design extended conditions in situations where, due to a common-cause failure, a loss of the function of the safety system or the function of the diversion means specified in the nuclear installation design may occur when ensuring basic safety functions,

r) ‘reactor control room’ means the room where nuclear installation operators can oversee the operation of nuclear installations with a nuclear reactor and control them in operational states and under accident conditions.

PART TWO

COMPLIANCE WITH THE PRINCIPLES FOR THE SAFE USE OF NUCLEAR ENERGY

Title I

General rules for compliance with the principles for the safe use of nuclear energy

§ 4

Safety objectives of nuclear installation design

(1) Nuclear installation design, including nuclear installation modification design, shall fulfil the following safety objectives:

a) prevent accident conditions,
b) mitigate the consequences of accident conditions, if they occur,
c) ensure that the following are practically excluded events
   1. a radiological accident where there is not sufficient time to implement urgent action to protect the population (hereinafter referred to as ‘early radiological accident’) and
   2. a radiological accident requiring urgent action to protect the population that cannot be limited in terms of location or time (hereinafter referred to as ‘large radiological accident’),
d) ensure nuclear safety, radiation protection, technical safety, radiation situation monitoring, radiological emergency management and security when managing radioactive waste and decommissioning the nuclear installation,
e) take into account human factor impact on the function of the nuclear installation and each of its systems, structures and components relevant to nuclear safety, radiation protection, radiation situation monitoring, radiological emergency management and security, and the influence of the nuclear installation’s properties on human performance, and
f) introduce processes ensuring compliance of the nuclear installation design throughout the life cycle of the nuclear installation with the current state of
   1. experience from the operation of nuclear installations,
   2. international experience,
   3. the nuclear installation with regard to ageing of its systems, structures and components, and
   4. science and technology.

(2) The design of safeguarded installations shall comply with the technical requirements concerning safeguards of the International Atomic Energy Agency arising from international treaties binding on the Czech Republic2).

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2) Agreement between the Kingdom of Belgium, the Kingdom of Denmark, the Federal Republic of Germany, Ireland, the Italian Republic, the Grand Duchy of Luxembourg, the Kingdom of the Netherlands, the European Atomic Energy Community and the International Atomic Energy Agency in implementation of Article III(1) and (4) of the Treaty on the Non-Proliferation of Nuclear Weapons, promulgated under No 35/2010.
Additional Protocol to the Agreement between the Republic of Austria, the Kingdom of Belgium, the Kingdom of Denmark, the Republic of Finland, the Federal Republic of Germany, the Hellenic Republic, Ireland, the Italian Republic, the Grand Duchy of Luxembourg, the Kingdom of Netherlands, the Portuguese Republic, the Kingdom of Spain, the Kingdom of Sweden, the European Atomic Energy Community and the International

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§ 5

Circumstances affecting nuclear installation design and operation

Nuclear installation design shall, in the context of ensuring resilience and protection of the nuclear installation against the hazards arising from the characteristics of the area for siting the nuclear installation and the occurrence of internal events and conditions, take into account

a) random failures of systems, structures and components,
b) internal events triggered by
    1. the area characteristics,
    2. on-site conditions,
    3. a failure of the nuclear installation and
    4. error of nuclear installation operators, and
c) the scenario brought about by the combined effect of area characteristics, internal events and abnormal operation or accident conditions caused by these effects.

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Application of defence-in-depth

§ 6

(1) Nuclear installation design shall, in the context of ensuring compliance with requirements for the application of defence-in-depth, set out requirements for the nuclear installation ensuring

a) the application of defence-in-depth for all activities relevant to nuclear safety,
b) the creation of a series of successive physical safety barriers backing up each other that are placed between radioactive materials and the surrounding area of the nuclear installation,
c) systems, structures and components and procedures for the application of the safety functions to protect the integrity and functionality of physical safety barriers at the various levels of defence-in-depth and
d) prevention of the occurrence of a radiological emergency using physical safety barriers.

(2) For nuclear installations with a nuclear reactor, the function of physical safety barriers shall be ensured by

a) the structure of the nuclear fuel material,
b) fuel element cladding,
c) the hermetical boundary of the primary cooling circuit of the nuclear reactor (hereinafter referred to as the ‘primary circuit’) and
d) the containment system.

(3) For nuclear installations without a nuclear reactor, the function of physical safety barriers shall be ensured by

a) packaging or

Atomic Energy Agency, in implementation of Article III(1) and (4) of the Treaty on the Non-Proliferation of Nuclear Weapons, promulgated under No 36/2010.

b) others systems, structures and components for the fabrication, processing, storing, managing and depositing of nuclear or other radioactive material or processing and disposal of radioactive waste.

(4) In the context of ensuring compliance with requirements for the application of defence-in-depth, nuclear installation design shall ensure, as far as reasonably practicable, effective prevention of

a) threats to the integrity and function of physical safety barriers,
b) the loss of function of one or more physical safety barriers caused by an initiating event,
c) the loss of function of one physical safety barrier as a result of the loss of function of another physical safety barrier and
d) the loss of function of a physical safety barrier caused by operator error or error in maintenance of the nuclear installation, and
e) the loss of function of the last physical safety barrier in the event of a severe accident before the safety objectives referred to in § 4(c), point 1, have been met.

(5) Nuclear installation design shall, in the context of ensuring compliance with requirements for the application of defence-in-depth, set out technical and organisational measures for managing abnormal operation, design basis accidents and design extended conditions, including severe accidents.

(6) 'Reasonably practicable' shall be taken to mean compliance with a requirement set out in this Implementing Decree where the risk of a radiological accident due to the nuclear installation's insufficient capability to meet the set safety objectives is reduced, while the reasons and conditions for using the nuclear installation do not change significantly.

§ 7

(1) The operation of a nuclear installation in the event of a loss of the safety function of a physical safety barrier may be admissible in nuclear installation design, if the risk analysis for selected operational states of the nuclear installation with a view to the existence of other physical safety barriers demonstrates that nuclear safety, radiation protection, radiation situation monitoring, radiological emergency management and security are ensured.

(2) Nuclear installation design shall, in the context of ensuring compliance with requirements for the application of defence-in-depth, ensure that a failure of a system, structure or component or loss of a safety function at one level does not reduce the effectiveness of the safety functions at the subsequent levels of defence-in-depth necessary to remedy or mitigate the consequence of an initiating event.

(3) In order to create systems of subsequent defence-in-depth levels, the nuclear installation design may only use those systems, structures and components of the systems of the preceding defence-in-depth level that has been broken which

a) have not been compromised in the course of the development of the nuclear installation's response to an off-site or on-site initiating event or scenario and
b) are separable from the compromised or unusable parts of the systems of the preceding defence-in-depth level that has been broken.

(4) If the procedures for managing design extended conditions in the nuclear installation design envisage the use of alternative systems and procedures comprising the application of mobile means, the nuclear installation design shall ensure the creation of connection points in the nuclear installation which

a) are physically accessible under design extended conditions,

b) make it possible to adhere to radiation protection rules with regard to emergency workers and
c) provide for the planned use of mobile means.

(5) In order to manage design extended conditions, the design of nuclear installations with a nuclear reactor shall ensure reasonably practicable technical and organisational measures to achieve such resilience of the nuclear installation that

a) a severe accident, which could lead to an early radiological accident or a large radiological accident, is a practically excluded event and
b) a severe accident that does not fall within the scope of practically excluded events and which could lead to a radiological accident is managed in such a manner that no protective measures stricter than those referred to in § 104(1)(a) and (b), points 2 and 3, of the Atomic Act are necessary.

(6) Nuclear installation design shall set out and evaluate reasonably practicable measures for managing a postulated severe accident corresponding to the type of the nuclear installation so that

a) the damaged and melting core and the stored nuclear fuel or nuclear material being handled are cooled and the melt from the damaged and melting core is contained,
b) the development of the subsequent fission chain reaction is prevented and
c) the safety objectives of the design referred to in § 4(c) are complied with.

(7) The requirement referred to in paragraph (6) shall also be fulfilled if, using the conservative approach, it is demonstrated in the nuclear installation design documentation that the occurrence of a severe accident is a practically excluded event.

Requirements for selected equipment and safety functions

§ 8

(1) Nuclear installation design shall, in the context of ensuring compliance with requirements for selected equipment, set out technical specifications containing

a) the technical requirements for the design, manufacture, checks and maintenance of selected equipment,
b) requirements for reliable energy supply for selected equipment in all states of the nuclear installation for the management of which the selected equipment is intended in the nuclear installation design,
c) requirements for resilience of selected equipment to the working environment conditions,
d) requirements for resilience of selected equipment to the load imposed by area characteristics,
e) requirements for reliability of selected equipment in standby mode and
f) requirements for the quality assurance standard for selected equipment.

(2) Nuclear installation design shall, in the context of ensuring compliance with safety functions according to their categorisation, classify systems, structures and components into

a) systems, structures and components without relevance to nuclear safety,
b) systems, structures and components with relevance to nuclear safety that are not selected equipment and
c) selected equipment, namely
    1. selected equipment other than safety systems and
    2. safety systems.

(3) Nuclear installation design shall, in the context of ensuring compliance with safety functions according to their categorisation, classify safety systems according to the functions they provide into

a) protection control and management systems (hereinafter referred to as ‘protection systems’),
b) execution systems and
c) support systems.

(4) Nuclear installation design shall set requirements for the systems referred to in paragraph (3) so that

a) protection systems monitor quantities or states of the nuclear installation relevant to nuclear safety and automatically trigger interventions from execution systems designed to prevent hazardous or potentially hazardous conditions,
b) execution systems ensure the relevant safety functions as soon as initiated by protection systems and
c) support systems ensure support functions for safety functions of protection systems and execution systems.

(5) Nuclear installation design shall set requirements for the systems, structures and components referred to in paragraph (2)(b),

a) which are intended to limit the impacts of a failure or malfunction of selected equipment or
b) whose failure may have a negative effect on systems, structures and components referred to in paragraph (2)(c).

(6) Nuclear installation design shall set requirements for selected equipment and the systems, structures and components referred to in paragraph (2)(b) intended by nuclear installation design for the prevention and management of design extended conditions so that they have

a) the capacity and properties to serve their purpose and
b) the environment qualification to ensure their safety functions for the necessary period of time.

(7) The requirements referred to in paragraphs (5) and (6) shall be set out in the technical specifications referred to in paragraph (1) according to

a) the importance of the safety function to the performance of which the systems, structures and components contribute, and
b) the influence of a loss of function and integrity of the systems, structures and components on the performance of the safety function.

§ 9

(1) Nuclear installation design shall classify selected equipment, or parts thereof, that serve multiple safety functions into safety classes corresponding to the safety function with greatest relevance to nuclear safety.

(2) Nuclear installation design shall ensure that a failure of selected equipment does not cause a failure of selected equipment classified in a higher safety class.

(3) Nuclear installation design shall classify the support system ensuring the operability of selected equipment into the same safety class as that of the selected equipment the operability of which is ensured by the support system.

(4) Nuclear installation design shall ensure that a failure of a support system does not restrict

a) the performance of safety functions by more than one of the parts of the safety system that are backing up each other or
b) the performance of the function of diversion means ensuring or substituting the safety function of the safety system jeopardised by this failure.

(5) Nuclear installation design shall specify the scope of tests or calculation procedures to verify the following properties of selected equipment throughout the period of its design life in an environment corresponding to the operating conditions and its design function in accident conditions:

a) stress resistance,
b) functionality,
c) reliability and
d) environment qualification.

(6) Nuclear installation design shall specify which components, sections or parts of selected equipment are important for the performance of the safety function and classify them into safety classes.

(7) The criteria for classifying selected equipment into safety classes are laid down in Annex 1 to this Implementing Decree.

Design basis

§ 10

(1) The design basis shall set the values of the parameters important for designing the nuclear installation and the resulting requirements for nuclear installation design resistance, in particular

a) the parameters of the expected states of the nuclear installation, including the state after a postulated internal initiating event in the nuclear installation envisaged in nuclear installation design,
b) the acceptance criteria for the consequences of the states of the nuclear installation envisaged in nuclear installation design,
c) the parameters of the influence of area characteristics, the severity of which is identified in the assessment of the area for siting the nuclear installation,
d) the data from the physical protection plan based on an analysis of the consequences of an intentional attack against the nuclear installation using an aircraft and
e) the data characterising the safety functions ensured by the systems, structures and components of the nuclear installation.

(2) The design basis shall set out

a) the categories of intensity of the load on the nuclear installation imposed by area characteristics and the frequency of incidence of these loads,
b) the categories of the frequency of incidence of the envisaged states of the nuclear installation,
c) environment qualification requirements for systems, structures and components,
d) the categories of the consequences of the envisaged states of the nuclear installation and
e) the acceptance criteria relevant to the categories of the envisaged states of the nuclear installation and the consequences of these states.

(3) In the nuclear installation design process, the elementary design basis shall be established in the context of the design basis.

(4) The elementary design basis shall set requirements for reasonably practicable resilience to area characteristics of systems, structures and components of the nuclear installation relevant to nuclear safety.The intensity of these area characteristics shall be determined by evaluating the area characteristics as to the frequency of their incidence at which compliance with safety objectives will be ensured.

(5) The resilience of systems, structures and components of the nuclear installation relevant to nuclear safety referred to in paragraph (4) shall ensure that, for the determined intensity of area characteristics, it is very likely that only random failures of systems, structures and components of the nuclear installation relevant to nuclear safety will occur.

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§ 11

(1) The elementary design basis shall specify the design basis external events for the area for siting the nuclear installation.These design basis external events shall be the limit value for the load on systems, structures and components of the nuclear installation imposed by area characteristics and the combinations thereof, at which the safety objectives of the nuclear installation design can be expected to be fulfilled with high degree of confidence.

(2) When determining design basis external events, all events triggered by the area characteristics included in the assessment of the area for siting the nuclear installation shall be considered.

(3) The frequency of incidence of a design basis external event shall not be more than once in 10 000 years, except for those area characteristics for which, based on the method used to assess the area for siting the nuclear installation, other incidence frequencies and the corresponding acceptance criteria must be used.

(4) The design basis external events for the design and assessment of resilience of selected equipment and systems, structures and components relevant to nuclear safety necessary for managing accident conditions and radiological accidents shall

a) for determination of seismic resistance, be based on the postulated peak horizontal acceleration of the subsoil under the structure that carries this system, construction or component, which shall not be less than 1/10 of gravitational acceleration and
b) for determination of resistance to accidental fall of aircraft or other objects, be based on the intensity of the effects of the fall of such an object, the frequency of which is greater than once per 10 000 000 years.

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§ 12

(1) The design basis shall ensure compliance with the principles for the safe use of nuclear energy for

a) design basis external events and their very likely combinations, using conservative assumptions as to the baseline state of the nuclear installation and possible accompanying failures that do not prevent effective intervention from safety systems and
b) external design events and scenarios which, due to their frequency of incidence and severity, fall within the scope of design extended conditions.

(2) Compliance of nuclear installation design with the requirement referred to in paragraph (1)(a) shall be ensured

a) through resilience of selected equipment and systems, structures and components relevant to nuclear safety other than selected equipment so that they withstand with a margin the consequences of design basis external events and working environment,
b) by using passive functions of systems, structures and components to ensure safety functions, if reasonably practicable,
c) by automatic intervention from safety systems and intervention from other systems relevant to nuclear safety on the basis of interventions by operators in accordance with internal regulations in the event of a subsequent failure caused by an event referred to in paragraph (1)(a) and
d) without affecting negatively the protection against other internal events caused by external design events.

(3) When ensuring compliance with the requirement referred to in paragraph (1)(b), nuclear installation design shall

a) take into account the foreseeable possibilities of further development and consequences of the external design event,
b) take into account the influence of the external design event on
    1. common-cause failures in systems, structures and components that are backing up each other,
    2. failures of multiple nuclear installations located in the same area for siting nuclear installations,
    3. threats to regional infrastructure and external supply of resources and
    4. restricted feasibility of protective measures,
c) ensure sufficient capacity and means for managing accident conditions and radiological accidents caused by external design events in areas for siting nuclear installations with multiple nuclear installations expected to share support equipment and services,
d) include the means and procedures for monitoring the incidence of area characteristics and provision of alerts about them,
e) specify the intervention levels for monitored parameters from area characteristics monitoring for the activation of preventive measures in the nuclear installation and on-site and off-site protective measures and initiation of checks of the nuclear installation after an external design event and
f) specify measures for the substitution of personnel and provision for supplies of the necessary resources in the case of long-developing events.

(4) When ensuring compliance of nuclear installation design with the requirement referred to in paragraph (1)(b), external design events and the corresponding scenarios falling within the scope of design extended conditions shall be assessed and the nuclear installation design shall propose reasonably practicable measures aimed at extreme events.

(5) When assessing external design events and scenarios of the events referred to in paragraph (4), an analysis shall be made

a) specifying the levels of severity of external events at which the performance of basic safety functions cannot be ensured,
b) demonstrating that systems, structures and components relevant to nuclear safety that can be used for managing accident conditions have a reserve capacity before they lose their resilience and functionality,
c) specifying the means of ensuring compliance with the principles for the safe use of nuclear energy and

d) demonstrating compliance with the requirements referred to in paragraph (3)(d) to (f).

(6) Based on the results of the analysis referred to in paragraph (5), procedures for the application of the means referred to in paragraph (5)(c) shall be laid down.

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Title II

Rules for compliance with the principles for the safe use of nuclear energy in the case of special activities and nuclear installations

Compliance with the principles for the safe use of nuclear energy when handling and storing nuclear fuel

§ 13

(1) Nuclear installation design shall set requirements for compliance with the principles for the safe use of nuclear energy when handling and storing fresh and irradiated nuclear fuel for

a) fresh nuclear fuel in
   1. separate facilities for storing fresh nuclear fuel or
   2. the premises of nuclear installations with a nuclear reactor intended for storing fresh nuclear fuel and
b) irradiated nuclear fuel in an irradiated nuclear fuel storage facility, which may either be premises of a nuclear installation or a storage facility for spent nuclear fuel (hereinafter referred to as ‘irradiated nuclear fuel storage facility’), in particular an irradiated nuclear fuel storage facility with a liquid cooling medium (hereinafter referred to as ‘storage pool’).

(2) Nuclear installation design shall, with regard to requirements for compliance with the principles for the safe use of nuclear energy when handling and storing fresh and irradiated nuclear fuel, ensure that

a) the physical safety barriers are protected by means of defence-in-depth based, in particular, on the inherent properties or passive functions of systems, structures and components,
b) periodic checks and tests of selected equipment are performed,
c) the likelihood of damage to or loss of nuclear fuel is minimised,
d) nuclear fuel is prevented from falling during transport,
e) objects are prevented from falling on the fuel assembly and
f) the stored nuclear fuel is kept subcritical by means of suitable spatial distribution thereof or other physical means and procedures specified using the conservative approach so that the values below are not exceeded
   1. 0.95 of the effective neutron multiplication coefficient under the assumed conditions of a design basis accident or
   2. 0.98 of the effective neutron multiplication coefficient under the conditions of optimal moderation of the fuel stored in packaging or storage facilities designed for depositing nuclear fuel without using a liquid cooling medium.

§ 14

(1) The design of nuclear installations with a nuclear reactor shall set requirements for compliance with the principles for the safe use of nuclear energy when handling and storing irradiated nuclear fuel in an irradiated nuclear fuel storage facility.

(2) Nuclear installation design shall, with regard to requirements for compliance with the principles for the safe use of nuclear energy when handling and storing irradiated nuclear fuel, ensure

a) the removal of residual heat of irradiated nuclear fuel in operational states and design basis accidents,
b) sufficient capacity of the irradiated nuclear fuel storage facility to allow for regrouping fuel assemblies or packaging for the needs of checks, location of damage and repair and removal of nuclear fuel from the core,
c) sufficient capacity of the irradiated nuclear fuel storage facility to allow for handling packaging containing irradiated nuclear fuel or individual fuel assemblies, when decommissioning the nuclear installation or in the event of unexpected operational problems, in a manner ensuring nuclear safety and radiation protection,
d) technical means for the storage pool making it possible
    1. to perform regular checks and tests to monitor the integrity of fuel elements and fuel assemblies,
    2. to store and handle leaky fuel elements or damaged fuel assemblies, including situations where it is not possible to handle them using the means intended for operational handling of fuel assemblies or fuel elements in the nuclear installation design,
    3. to close hermetically irradiated nuclear fuel that does not meet the design criteria relating to irradiated nuclear fuel integrity, the content of other radioactive materials in the fuel, tests of fuel elements and fuel assemblies or the possibility of repairing fuel assemblies,
    4. to check the chemical composition and content of radionuclides in the medium, in which irradiated nuclear fuel is stored or handled,
    5. to monitor and control the temperature and coolant levels in the storage pool and detect leaks from this pool,
    6. to maintain, using operative and diversion means, the cooling capacity of the storage pool in all states of the nuclear installation such as to prevent the uncovering of fuel assemblies in accident conditions and
    7. to connect alternative means capable of ensuring long-term cooling of the storage pool under design extended conditions.

§ 15

(1) Calculation analyses used in nuclear installation design demonstrating subcriticality of storage of nuclear fuel shall be made using the conservative approach and take into account

a) the effect of geometric and material properties of the facility for storing nuclear fuel, in particular
    1. the geometry of this facility, including the properties of the construction materials used,
    2. the pitch between the fuel elements in the fuel assembly and
    3. the number and level of enrichment of the fuel elements,
b) the effect of the presence of dissolved boron in the storage pool, if
    1. the storage pool remains subcritical when filled up with fully enriched nuclear fuel and water of maximum density without the presence of dissolved boron, even after all uncertainties have been taken into account,
    2. the effective neutron multiplication coefficient of the storage pool when filled up with fully enriched nuclear fuel and water of maximum density does not exceed 0.95,

even if the partial effect of the presence of boron and all uncertainties are taken into account together with

3. the effect of the presence of soluble boron, expressed as proportion of the nominal boron concentration in the storage pool;the proportion is given by the maximum dilution rate of the boron content, the time delay between the occurrence and detection of dilution and the time needed for intervention to prevent dilution;the effect of no more than 40 % of the nominal concentration of soluble boron specified for the storage pool can be taken as the proportion,

c) the effect of the burning out absorbers integrated into fuel, taking into account
   1. the type, distribution and quantity of the integral burning out absorber and
   2. the highest neutron multiplication capacity of nuclear fuel and
d) the effect of fuel burn-up, if
   1. its neutron multiplication capacity can be assessed and
   2. it is spent nuclear fuel used in the core for at least one fuel campaign.

§ 16

Compliance with the principles for the safe use of nuclear energy when decommissioning a nuclear installation

(1) Nuclear installation design shall set requirements for compliance with the principles for the safe use of nuclear energy when decommissioning a nuclear installation in accordance with the requirements under the implementing decree on the requirements for the safe management of radioactive waste and on the decommissioning of nuclear installations or category III or IV workplaces.

(2) Nuclear installation design shall set the following requirements for compliance with the principles for the safe use of nuclear energy when decommissioning a nuclear installation:

a) the technical and organisational measures enabling the implementation of decommissioning shall be specified,
b) the timetable for the various methods of decommissioning shall be established,
c) requirements for the final state of the area where the nuclear installation is sited after all decommissioning activities have been completed shall be specified,
d) the quantity of the material to be handled in the course of decommissioning shall be established,
e) the methods of reducing contamination due to seepage and leaks shall be specified, in particular
   1. by limiting the number of built-in piping channels in floors and walls,
   2. by limiting the use of underground tanks, vaults and drainage channels for radioactive materials and
   3. by providing possibilities for separating the technological systems using radioactive and non-radioactive materials,
f) the material composition of systems, structures and components directly exposed to the neutron flux shall be such as to minimise the production of materials with induced activity,
g) the chemical regimes in the primary circuit shall be such that the corrosion layers of the materials in this circuit are stabilised,
h) direct or otherwise suitably laid and arranged pipeline routes shall be used; their surface finish shall be such as to prevent, or allow for maintenance to prevent, the settling of radioactive or contaminated material,

i) requirements for the technical and organisational measures for carrying out the decontamination of systems, structures and components shall be specified,
j) requirements for the technical and organisational measures for reducing the contamination of concrete in the event of leakage and degradation processes at metal-concrete interfaces shall be specified,
k) the use of hazardous substances shall be limited to the lowest reasonably practicable level,
l) easy access to and easy disassembly of contaminated systems, structures and components shall be ensured,
m) the possibility of decontamination using remote-controlled means shall be ensured where other methods cannot be used,
n) the links with other nuclear installations located in the same area for siting nuclear installations shall be taken into consideration,
o) measures for the retention of documentation and collection of operational data for the needs of decommissioning shall be specified and
p) 3D digital modelling of the nuclear installation shall be used to document and keep record of systems, structures and components with an impact on nuclear safety when decommissioning this nuclear installation.

(3) Nuclear installation design shall identify systems, structures and components intended for the operation and decommissioning of the nuclear installation and those intended explicitly for the decommissioning of the nuclear installation, and specify requirements for the method of using them when decommissioning the nuclear installation.

§ 17

Compliance with the principles for the safe use of nuclear energy when managing radioactive waste

(1) Nuclear installation design shall set requirements for the nuclear installation to ensure that radioactive waste is managed in compliance with the principles set out by the Atomic Act, the implementing decree concerning radiation protection and security of radionuclide sources and the implementing decree on the requirements for the safe management of radioactive waste and on the decommissioning of nuclear installations or category III or IV workplaces.

(2) Nuclear installation design shall ensure compliance with the basic safety functions using methods corresponding to the properties and manageability of radioactive waste.

(3) Nuclear installation design shall set requirements for the facility used to manage radioactive waste before disposal so that

a) it is accessible for the needs of maintenance and repair,
b) it is easy to decontaminate,
c) it allows for supervision of the management of radioactive waste in accordance with the requirements of the implementing decree on the requirements for the safe management of radioactive waste and on the decommissioning of nuclear installations or category III or IV workplaces,
d) it allows for the removal of radioactive material deposits or sediments,
e) it allows for collection and return of radioactive material leaked from this facility and
f) allows for regular monitoring of quantities demonstrating proper function of the facility.

(4) Nuclear installation design shall set requirements for the facility used when processing and treating radioactive waste containing explosive or flammable substances so that

a) it is resistant to the effects of explosion or fire and
b) includes a system for the monitoring of quantities that have an effect on explosivity or risk of fire and ensuring that nuclear installation operators are alerted in the event of an increased risk of explosion or fire.

§ 18

Compliance with the principles for the safe use of nuclear energy by radioactive waste storage facilities

(1) The design of a nuclear installation which is a radioactive waste storage facility, shall ensure

a) that the systems, structures and components used are preferably those with a passive function with regard to ensuring the basic safety functions of the radioactive waste storage facility,
b) safe handling, storage and removal of radioactive waste under all foreseeable situations,
c) prevention of damage to the packaging for storing radioactive waste when radioactive waste or the packaging are handled,
d) that the integrity of the packaging for storing radioactive waste can be regularly checked,
e) reserve storage capacity for moving, repacking, checking, maintenance and retrieval of radioactive waste,
f) equipment of the radioactive waste storage facility with systems, structures and components to ensure its functions corresponding to the type, form, activity and quantity of the radioactive waste stored and
g) technical and organisational measures enabling regular check of the condition and equipment of the radioactive waste storage facility.

(2) The design of a nuclear installation which is a radioactive waste storage facility shall, for the purposes of storing liquid radioactive waste, ensure

a) that the storage tanks are leak-proof,
b) that the storage tanks are protected against corrosion,
c) that the storage tanks are protected against overfilling,
d) systems for monitoring the storage tank filling level,
e) that the storage tanks are placed in protective vaults that can accommodate the volume of liquid radioactive waste in the storage tanks,
f) for protective vaults
    1. that they are watertight,
    2. that leakage of radioactive waste from storage tanks is signalled and
    3. the availability of equipment for removal of the content,
g) removal of vapours from storage tanks and protective vaults and processing thereof as radioactive waste,
h) that the content of the storage tanks and protective vaults can be homogenised and removed,
i) that an empty tank with a capacity corresponding to that of the largest tank within the system is available for each storage tank system and

j) for storage in containers
   1. impermeability of the floors and walls of the radioactive waste storage facility to such a height as to prevent the release of the liquid radioactive waste into the environment even if the maximum quantity of waste is leaked from the container and
   2. that the floor is sloped to a drainless impermeable vault.

§ 19

Compliance with the principles for the safe use of nuclear energy by radioactive waste repositories

(1) The design of a nuclear installation which is a radioactive waste repository shall ensure that

a) the most unfavourable properties of the deposited radioactive waste are taken into account,
b) systems, structures and components with a passive function are used as far as reasonably practicable,
c) the radioactive waste repository complies with
   1. the requirements for the characteristics of the area in which it is sited, in accordance with the implementing decree concerning the siting of nuclear installations,
   2. the planned quantity and properties of radioactive waste, in accordance with the implementing decree on the requirements for the safe management of radioactive waste and on the decommissioning of nuclear installations or category III or IV workplaces,
   3. normal operation conditions and developments in the state of the siting area and the state of the nuclear installation anticipated in the nuclear installation design in the course of its life cycle and after the radioactive waste repository has been shut down,
   4. alternative scenarios of future developments in the state of the siting area and the state of the nuclear installation that could lead to operational occurrences and radiological emergencies, and
   5. the effect of ageing of the passive function systems, structures and components used,
d) the components of the radioactive waste repository are chemically and physically compatible with the deposited radioactive waste and the environment inside this repository,
e) the storage areas of the radioactive waste repository are protected against two-way water seepage when in operation,
f) the possibility of contact of the stored radioactive waste with water is minimised while in operation during operation and
g) the radioactive waste repository is protected against flooding or swamping, especially by rainwater or groundwater, after it has been shut down.

(2) The design of a nuclear installation which is a radioactive waste repository shall also ensure that

a) the original properties of the geological environment are preserved as far as possible when constructing the radioactive waste repository,
b) there is a system for monitoring the radioactive waste repository and the surrounding area to monitor
   1. the circulation of groundwater in the area where the radioactive waste repository is sited,
   2. ingress of water into and filling of the radioactive waste repository and
   3. leakage of radionuclides from the radioactive waste repository into the environment,

c) clogging or blockage of the drainage system, if part of the radioactive waste repository, is prevented,
d) water which has penetrated the storage area of the radioactive waste repository when filling it is removed and handled safely,
e) the correct functioning of the drainage system can be checked at least once a year throughout the period of operation and
f) the properties of the rock environment, relevant to nuclear safety, radiation protection, technical safety, radiation situation monitoring, radiological emergency management and security and functioning of the system in accordance with point (b) in the period after the radioactive waste repository has been shut down, are preserved.

PART THREE

PREVENTION, RESILIENCE AND PROTECTION OF NUCLEAR INSTALLATIONS AGAINST INTERNAL EVENTS

§ 20

Design basis internal postulated initiating events

(1) Nuclear installation design shall set a list of design basis internal postulated initiating events.

(2) The list of design basis internal postulated initiating events shall be established on the basis of a technical assessment using deterministic and probabilistic methods of analysis or a combination thereof.

(3) The list of design basis internal postulated initiating events shall comprise events that may

a) randomly arise during the operation of the nuclear installation in accordance with the nuclear installation design and may have a significant impact on nuclear safety of the nuclear installation and
b) be caused by events triggered by
   1. the operational states of the nuclear installation,
   2. characteristics of the area,
   3. man-induced events or
   4. a combination of the circumstances referred to in points 1 to 3.

(4) Design basis internal postulated initiating events shall include, in particular

a) random single failures of systems, structures or components,
b) incorrect intervention by an operator or
c) a combination of design basis internal postulated initiating events and failures in the nuclear installation arising as a result of area characteristics taken into account in the elementary design basis.

§ 21

Postulated initiating events and scenarios for design extended conditions

(1) Nuclear installation design shall set a list of postulated initiating events and scenarios for design extended conditions.

(2) The list of postulated initiating events and scenarios for design extended conditions shall be established on the basis of a technical assessment using deterministic and probabilistic methods of analysis.

(3) The list of single postulated initiating events and scenarios for design extended conditions shall comprise events that may be triggered as a result of hidden faults of nuclear installation design or area characteristics whose intensity exceeds the level of design basis external events.

(4) In the context of ensuring that the nuclear installation design can cope with design extended conditions without severe damage to nuclear fuel, the management of postulated initiating events and scenarios for design extended conditions listed below shall be addressed technically

a) unusual concurrence of multiple initiating events that occur randomly in the states of the nuclear installation,
b) concurrence of internal initiating events triggered by particularly serious internal events or area characteristics,
c) common-cause failure of selected equipment,
d) concurrent common-cause failure of all nuclear reactors and spent nuclear fuel storage facilities, which are located in the same area for siting nuclear installations and
e) events that can affect all nuclear installations and other installations located in the same area for siting nuclear installations, cause an interaction between them and affect the surrounding infrastructure.

(5) If design extended conditions representing a severe accident occur, the nuclear installation design shall ensure that these are managed in such a manner that the safety objectives of the nuclear installation design for managing this type of events are fulfilled.

(6) Nuclear installation design shall ensure that there are means available under design extended conditions to keep the core and the storage pool for irradiated nuclear fuel subcritical over an extended period of time.

(7) Nuclear installation design shall ensure that, under design extended conditions, the nuclear installation is not dependent on external supplies of energy and inputs to support the safety functions for the period during which these cannot be restored with sufficient reliability.

§ 22

Categorisation of internal postulated initiating events and scenarios

(1) The defence-in-depth concept in nuclear installation design shall be based on categorisation of internal postulated initiating events and scenarios, which shall be implemented with a view to their anticipated frequency of occurrence and severity of the possible radiological emergency.

(2) Radiation and technical design acceptance criteria shall be specified for each category of internal postulated initiating events so that

a) initiating events with a high frequency of occurrence result in a first-degree radiological emergency or radiological incident and
b) radiological accidents have a very low frequency of occurrence.

(3) The radiation design acceptance criteria for each category of internal postulated initiating events and scenarios shall be specified in accordance with the requirements of the Atomic Act for optimising radiation protection of the population.

(4) The categorisation of internal postulated initiating events and scenarios shall differentiate between groups of internal postulated initiating events and scenarios with

a) a high frequency of occurrence, which means the occurrence of one or more internal postulated events of the same type over a period longer than one year of operation of the nuclear installation;only abnormal operation events may be included in this category,
b) a moderate frequency of occurrence, which means the occurrence of internal postulated initiating events of the same type over a period longer than 10 years of operation of the nuclear installation;internal postulated initiating events of less severe design basis accidents shall be included in this category,
c) a low frequency of occurrence, which means the occurrence of internal postulated initiating events of the same type over a period longer than the lifetime of the nuclear installation;internal postulated initiating events of severe design basis accidents shall be included in this category, and
d) a very low frequency of occurrence, which means the occurrence of internal postulated initiating events or scenarios over a period 100 times longer than the lifetime of the nuclear installation;internal postulated initiating events and scenarios of design extended conditions shall be included in this category.

§ 23

Ensuring prevention, resilience and protection of the nuclear installation against the effects of fire, explosion or products of combustion in the nuclear installation

(1) Nuclear installation design shall set requirements for ensuring prevention, resilience and protection of the nuclear installation against the effects of fire, explosion or products of combustion in the nuclear installation so that systems, structures and components relevant to nuclear safety and interventions by operators of the nuclear installation necessary with regard to nuclear safety, radiation protection, radiation situation monitoring, radiological emergency management and security are not exposed to undue risk from fire, explosion or products of combustion in the nuclear installation.

(2) Nuclear installation design shall set requirements for ensuring prevention, resilience and protection of the nuclear installation against the effects of fire, explosion or products of combustion in the nuclear installation in accordance with the requirements of the Fire Protection Act.

(3) Nuclear installation design shall set requirements for systems, structures and components of the nuclear installation relevant to nuclear safety so that the likelihood of fire at the site where they are located is as low as reasonably practicable and selected equipment can resist to the effects of fire and maintain its ability to perform safety functions.

(4) Nuclear installation design shall set requirements for fire detection and signalling systems which shall

a) detect fire and alert individuals on the nuclear installation site without delay,
b) notify of fire and its location the personnel in
    1. the reactor control room,
    2. the fire protection system control centre and
    3. the emergency control centre,

c) be equipped with
   1. secured power supply and
   2. signal transmission via cables capable of performing their function under the conditions of fire and
d) remain functional under the conditions of fire.

(5) Nuclear installation design shall set requirements for fixed and mobile fire-fighting equipment and backup equipment so that in the event of its failure or accidental activation, the performance of the safety function of selected equipment is not affected.

(6) Nuclear installation design shall set requirements for cables functional under the conditions of fire or fire retardant design of cabling for systems, structures and components relevant to nuclear safety in the reactor control room and the backup reactor control room (hereinafter referred to as the ‘backup room’).

PART FOUR

REQUIREMENTS FOR NUCLEAR INSTALLATION DESIGN IN TERMS OF THE ASSESSMENT OF PREVENTION, RESILIENCE AND PROTECTION OF THE NUCLEAR INSTALLATION

General rules

§ 24

(1) The standard of prevention, resilience and protection of nuclear installations against the hazards resulting from area characteristics and external and internal influences provided for by nuclear installation design shall be evaluated by assessing the compliance of the nuclear installation design with the requirements for nuclear installation design.The assessment of compliance of nuclear installation design with the requirements for nuclear installation design (hereinafter referred to as ‘design safety assessment’) shall be carried out based on tests of the nuclear installation or, if this is not possible, using deterministic calculation methods.

(2) Design safety assessment shall analyse and evaluate the resilience of systems, structures and components of the nuclear installation against area characteristics and the response of the nuclear installation to design basis internal postulated initiating events and postulated initiating events and scenarios falling within the scope of design extended conditions.

(3) When conducting design safety assessment, the conservative approach shall be preferably used in the methods of this assessment and when determining safety margins.

(4) When assessing the resilience of a nuclear installation after a postulated initiating event and a scenario falling within the scope of design extended conditions has arisen, it shall be demonstrated that the safety objectives are fulfilled when the realistic approach is used for the analysis and the setting of acceptance criteria.

(5) In the case of abnormal operation and design basis accidents, the uncertainties of the input parameters and the results of the design safety assessment shall be evaluated.

§ 25

(1) Design safety assessment shall demonstrate that

a) the design basis for the nuclear installation and its parts has been defined accurately,

b) the safety functions of the nuclear installation are being performed and the acceptance criteria for this assessment are complied with,
c) the management of abnormal operation events, design basis accidents and design extended conditions anticipated in nuclear installation design is ensured by intervention by the automatic function of safety systems and diversion systems and interventions by operators specified in internal regulations,
d) the control and protection systems have been accurately set up, specifically by
   1. acceptability of the response to their intervention, including responses to planned interventions by operators, and
   2. taking accurate account of the disturbances from systems, structures and components relevant to nuclear safety, including false triggering of safety systems or possible errors on the part of operators.

(2) Design safety assessment shall use proven methods corresponding to the current state of science and technology.

(3) The unique 1st and 2nd level probabilistic safety assessment referred to in the implementing decree concerning safety assessment requirements shall be used for the design of nuclear installations with a nuclear reactor.This probabilistic safety assessment shall demonstrate that

a) the nuclear installation design is well-balanced so that
   1. no system, structure, component, area characteristic or initiating event increases disproportionally the overall risk of a radiological accident and
   2. the risk of disruption of physical safety barriers is low and is not significantly affected by the uncertainties of the inputs used in the analysis and
b) the safety margins ensure prevention against the effects of small deviations in the parameters of the nuclear installation that can cause significant changes in its operating conditions.

§ 26

Design safety assessment for design basis internal postulated initiating events

(1) When analysing the resilience of a nuclear installation to design basis internal postulated initiating events, the design safety assessment shall demonstrate that the basic safety functions are performed through interventions of safety systems that guaranteed a high reliability of performance of the safety functions.The functions of other systems shall be taken into account in this analysis if they can aggravate the course of the nuclear installation’s response after a postulated initiating event.

(2) When analysing the resilience of a nuclear installation to design basis internal postulated initiating events, the design safety assessment shall take into account the incidence of the most severe single failure of safety systems with an active safety function.Where the failure of a passive function of systems, structures and components is a practically excluded event, it will not need to be taken into account in this analysis.

(3) When analysing the resilience of a nuclear installation to design basis internal postulated initiating events, the design safety assessment shall verify the efficiency of the intervention from safety systems when the ability of these systems to ensure a safety function is in the most unfavourable state, as anticipated in the nuclear installation design, for the course of the response to a design basis internal postulated initiating event.A failure of other systems, structures and components occurring as a result of a design basis internal postulated initiating event shall be considered to be part of this postulated initiating event.

(4) When analysing the resilience of a nuclear installation to design basis internal postulated initiating events, the design safety assessment shall demonstrate that the effect of uncertainties of input parameters and calculation procedures and that of manufacturing tolerances on the result of the analyses is taken into account with a sufficient margin in nuclear installation design.

Design safety assessment for the event of design extended conditions

§ 27

(1) Design safety assessment shall include analyses of resilience of the nuclear installation to design extended conditions.

(2) When analysing the resilience of a nuclear installation under design extended conditions, safety analyses of the development of events and scenarios chosen according to § 21(3) and (4) shall be conducted in the context of design safety assessment.

(3) It shall be verified that effective preventive or mitigating technical and organisational measures are applied in nuclear installation design for combinations of events and scenarios chosen according to § 21(3) and (4) to ensure compliance with the principles for the safe use of nuclear energy and compliance with safety objectives.

(4) When analysing the resilience of the nuclear installation under design extended conditions in the context of design safety assessment

a) analysis assumptions established by means of a realistic approach may be used,
b) a single failure of systems, structures and components does not need to be applied, and
c) interventions from systems that are not safety systems may be considered.

§ 28

(1) Design safety assessment for the event of design extended conditions shall demonstrate that systems, structures and components intended in nuclear installation design for the prevention and management of design extended conditions have the capacity and properties needed to serve their purpose and are adapted to the conditions under which they will serve their functions to perform these functions for the necessary period of time.

(2) In the context of design safety assessment for the event of design extended conditions, analyses of the management of design extended conditions shall be conducted which shall

a) demonstrate the efficiency of the means intended by nuclear installation design for the prevention of serious damage to nuclear fuel and mitigation of the course of a severe accident,
b) specify the consequences of a radiological accident, if it occurs,
c) demonstrate resilience margins of the systems, structures and components of the nuclear installation intended for managing design extended conditions up to the load levels imposed by area characteristics and the working environment leading to modification or loss of their design characteristics,
d) take into account the configuration of the nuclear installation, the properties of its systems, structures and components, the conditions associated with selected scenarios of the development of events and the feasibility of the response to a radiological emergency,
e) take into account the results of the 1st and 2nd level probabilistic safety assessment and

f) determine the endpoint state of the event and the requirements for the length of the period for which the systems, structures and components needed to manage the event should function.

PART FIVE

REQUIREMENTS FOR SYSTEMS, STRUCTURES AND COMPONENTS

Title I
General requirements for systems, structures and components

Reliability of systems, structures and components and resilience to failures

§ 29

(1) The reliability of systems, structures and components relevant to nuclear safety shall be ensured through

a) a system ensuring their environment qualification,
b) the method of ensuring resilience of systems to failures and
c) the method of maintaining and testing them.

(2) The environment qualification of systems, structures and components relevant to nuclear safety shall conform to the technical specifications set out by nuclear installation design.

(3) Compliance of the properties of systems, structures and components relevant to nuclear safety with the technical specifications shall be continuously verified and documented throughout the installation's lifetime.

(4) Selected equipment shall reliably perform its safety functions

a) under all states of the nuclear installation, including the states anticipated in the course of testing of the installation, and
b) in the event of an expected malfunction or incorrect function of the individual systems, structures and components relevant to nuclear safety, including malfunction caused by incorrect intervention by operators.

(5) Nuclear installation design shall, by means of physical separation, functional isolation, independence and backing up of systems and by using diversion means, ensure reliable performance of the safety function of selected equipment in the event of malfunction of selected equipment due to a single failure and common-cause failures.

(6) In the event of a failure or malfunction of any of its components, selected equipment shall spontaneously enter a state in which it contributes in a reasonably practicable manner to managing abnormal operation or accident conditions in the nuclear installation.

§ 30

(1) Nuclear installation design shall exclude any effects of systems, structures and components relevant to nuclear safety on the safety function of selected equipment.

(2) Nuclear installation design shall ensure automatic activation and control of safety systems or implementation of a safety function using passive function systems so that intervention by operators is not necessary until 30 minutes after the initiating event has occurred.

(3) The requirement under paragraph (2) need not be fulfilled in cases where an earlier intervention by operators is possible.Such cases shall be justified by an analysis demonstrating the possibility of an earlier intervention by operators.

(4) Nuclear installation design shall set measure to prevent malfunction of safety systems and systems ensuring nuclear safety of storage pools due to a common-cause failure which may lead to severe damage to nuclear fuel.

(5) Nuclear installation design shall set

a) the safety limits and acceptance criteria for parameters characterising the state of the nuclear installation,
b) restrictions for operational configurations of the nuclear installation,
c) requirements for operability and settings of selected equipment,
d) the period needed to restore operability of selected equipment and
e) requirements for checks and tests of selected equipment.

(6) The method of performance and frequency of the checks and tests of selected equipment specified by nuclear installation design shall sufficiently verify its reliability and shall not lead to excessive reduction of its life.

(7) Nuclear installation design shall set requirements for calibration and verification of the function of instruments and equipment for maintenance and performance of checks and tests of selected equipment.

§ 31

Requirements for selected equipment in the course of the life cycle of the nuclear installation

(1) Nuclear installation design shall set the method of environment qualification validity verification of selected equipment throughout the nuclear installation’s life cycle.

(2) The method of environment qualification validity verification of selected equipment shall set requirements for

a) testing before commissioning of selected equipment,
b) in-service testing of selected equipment and
c) testing in the event of maintenance, modification or trial operation of selected equipment.

(3) Nuclear installation design shall, taking the conservative approach, set the technical specifications for selected equipment so that deterioration of material properties due to ageing, including, in particular, fatigue, wear, neutron embrittlement, erosion, corrosion and other degradation mechanisms arising as a result of operation of selected equipment, is taken into account in safety margins.

Title II

Requirements for technical specifications for systems, structures and components of the nuclear reactor

Core

§ 32

(1) Nuclear installation design shall set requirements for the core and the related cooling, control and safety systems of a nuclear installation with a nuclear reactor so that

a) the systems can, taking the conservative approach to safety assessment, ensure compliance with design limits for the core in every operational state and
b) the resulting effect of immediate responses in the core counteracts the rapid increase in reactivity in all operational states with the nuclear reactor is in a critical and supercritical state.

(2) Mechanical components of the fuel system forming the core or mechanical components placed in its proximity, including their mounting, shall be implemented in nuclear installation design so that

a) they can withstand the static and dynamic effects of the processes in the nuclear reactor in the operational states,
b) in the event of a design basis accident and, as far as reasonably practicable, under design extended conditions, the disruption of these parts does not prevent achieving a stabilised subcritical state of the nuclear reactor and efficient cooling of the core as envisaged in nuclear installation design.

(3) The requirements for the fuel system of the core shall be set by nuclear installation design so that it does not become unacceptably damaged during its planned lifetime due to irradiation under the conditions in the operational states.

(4) In the fuel system design, the nuclear installation design shall, taking the conservative approach, take into account the mechanisms of deterioration of the material properties of the fuel system in the core due to

a) the action of external pressure of the coolant,
b) increased internal pressure in the fuel element,
c) changes in pressures and temperatures resulting from changes in output,
d) chemical influences,
e) static and dynamic stresses, including stresses caused by the flow of the coolant,
f) mechanical vibrations and
g) changes in the transmission of heat that may occur due to deformations or chemical influences.

(5) Nuclear installation design shall set acceptance criteria for nuclear fuel (hereinafter referred to as ‘fuel design criteria’) for operational states, including the tolerable radioactive release from fuel elements, which shall not be exceeded in operational states and under design basis accident conditions.

(6) Nuclear installation design shall specify the characteristics of the fuel system and the core and the operating conditions for the nuclear reactor so that

a) the conditions that may occur in the core during abnormal operation do not cause significant deterioration thereof,
b) releases of fission products from fuel elements are maintained at levels as low as reasonably practicable and
c) fuel elements and assemblies remain in place under design basis accident conditions and do not suffer damage that would prevent
    1. the introduction of reactivity control system components into the core,
    2. the functioning of other systems for reactivity control and shutting the reactor down, or
    3. effective cooling of the core.

§ 33

(1) Structural design of the fuel assemblies implemented in nuclear installation design shall make it possible to inspect their parts.

(2) The characteristics of fuel assemblies in nuclear installation design shall be tested, either experimentally or in operation in another nuclear installation, with regard to the ability of fuel assemblies to perform their design function safely.

(3) For nuclear reactors with a thermal output exceeding 50 MW, the nuclear installation design shall set requirements for the system of monitoring of thermal output and neutron flux level and distribution in the core.

(4) The system of monitoring of neutron flux distribution in the core shall have the capacity to detect areas in the core in which neutron flux levels and distribution could cause exceedance of fuel design criteria in the core for operational states.

(5) Structural design of the core in nuclear installation design shall allow the reactor output control system to keep neutron flux levels and distribution within the limits set in nuclear installation design in all states of the core in normal operation.

(6) The implementation of the core and the associated cooling, control, safety and information systems in nuclear installation design shall be such as to ensure that output oscillations that could cause exceedance of fuel design criteria are a practically excluded event.

Reactivity control and nuclear reactor shutdown systems

§ 34

(1) Nuclear installation design shall require that the nuclear reactor be equipped with execution systems for reactivity control and reactor shutdown that can shut it down in operational states and in the course of design basis accidents.These systems shall also keep the nuclear reactor shut down in situations causing maximum core reactivity and ensure compliance with the set design criteria for nuclear fuel.

(2) Reactivity control and nuclear reactor shutdown systems in nuclear installation design shall be made up of no less than two independent systems based on different technical principles and capable of performing their functions even in the event of a single failure.

(3) At least one of the systems referred to in paragraph (2) shall be a rapid reactor shutdown system that can, on its own, bring the nuclear reactor from an operational state or a design basis accident to a subcritical state with an adequate safety margin, even in the case of a single failure of this system.

(4) At least one of the systems referred to in paragraph (2) shall be able, on its own, to bring the nuclear reactor from normal operation to a subcritical state and maintain the reactor in a subcritical state with an adequate safety margin if maximum core reactivity occurs.

(5) The implementation of the system referred to in paragraph (2) in nuclear installation design shall be such as to ensure that other systems of the nuclear installation cannot cause a loss of function of a part of this system.

(6) In abnormal operation and in the event of a design basis accident, the systems referred to in paragraph (2) shall be able to prevent, after achieving a stabilised subcritical state, the critical state of the nuclear reactor from recurring spontaneously, including in the case of a single failure of these systems.

§ 35

(1) Nuclear installation design shall specify the measurement systems and tests to verify that

a) reactivity control and nuclear reactor shutdown systems can meet the requirements under § 34 and
b) reactivity control and nuclear reactor shutdown systems perform their safety functions in all operational states and in the event of a design basis accident.

(2) Nuclear installation design shall set measures that can ensure subcriticality of the core while managing design extended conditions.

(3) Nuclear installation design shall set reasonably practicable measures to ensure long-term subcriticality of molten core in the event of a severe accident.

Primary circuit

§ 36

(1) The primary circuit requirements in nuclear installation design shall be set so that, with support from other systems of the nuclear installation, the primary circuit serves the basic safety functions throughout its design life in all operational states and under the conditions of a design basis accident.

(2) Nuclear installation design shall set requirements for materials and manufacturing and testing procedures for primary circuit components in a manner corresponding to the nature of the nuclear installation and in conformity with statutory requirements.

(3) For the pressure vessel of the nuclear reactor and other primary circuit components, nuclear installation design shall, for the period of the nuclear installation's life cycle,

a) set requirements so as to ensure
   1. their resilience to material defects, including rupture,
   2. low velocity of the propagation of material defects,
   3. resistance to brittle fracture of the material and
   4. that pressure vessel rupture is a practically excluded event,
b) specify the method of detection and monitoring of the defects referred to in point (a) and
c) specify the method of influencing material embrittlement.

(4) Nuclear installation design shall set conditions for the operation and protection of the primary circuit in operational states and for tests of this system so that an assessment of the impacts that can damage it can be conducted and the safety limits and acceptance criteria for these tests, including design limits, can be set.

(5) Nuclear installation design shall set requirements for the primary circuit and its support, control and protection systems so that the acceptance criteria referred to in paragraph (4) are

a) set taking the conservative approach and
b) complied with in all states of the nuclear installation anticipated in nuclear installation design.

§ 37

(1) Nuclear installation design shall provide for means of early detection of coolant leakage from the primary circuit and procedures for periodic checks and tests of the state of

the primary circuit, including assessment of the properties of the material of the nuclear reactor vessel.

(2) Means to protect the primary circuit against over-pressurisation shall be proposed in nuclear installation design to ensure that there is no radioactive release of outside the nuclear installation and into the operating area, with the exception of justified and time-limited discharges into systems or area inside the containment vessel of the nuclear reactor designed for this purpose, if necessary to manage accident conditions.Abnormal operation shall be managed without intervention from these means.

(3) Nuclear installation design shall require that connecting pipelines of the primary circuit be equipped with separation elements to prevent leakage of coolant containing radioactive material outside the primary circuit.

(4) In order to keep the coolant in the primary circuit in sufficient quantity and regulate coolant volume changes in all operational states, nuclear installation design shall provide for a replenishment system.

(5) Components placed inside the primary circuit shall be designed so that they are highly reliable and that, in the event of their failure, other parts of the primary circuit are not subsequently damaged in operational states and under the conditions of a design basis accident.

§ 38

(1) Nuclear installation design shall set requirements for core emergency cooling safety systems, which shall, in the event of a design basis accident involving disruption of the integrity of the nuclear reactor coolant pressure circuit and leakage of coolant from the primary circuit, ensure heat removal from the core to the surrounding environment for a sufficiently long period of time so that

a) the design limits for fuel element disruption are not exceeded,
b) the energy consequences of the chemical reaction between nuclear fuel and primary circuit coolant are within the acceptance criteria set by nuclear installation design and
c) there are no changes to the geometry of fuel elements, fuel assemblies or inner part of the nuclear reactor that could affect core cooling efficiency.

(2) Nuclear installation design shall ensure that, when a postulated initiating event involving leakage of coolant from the primary circuit occurs, the efficiency of the intervention from core emergency cooling systems is not negatively affected, in particular due to

a) inappropriate system configuration and
b) inappropriate location of the connection to the primary circuit.

(3) Nuclear installation design shall set requirements for the core emergency cooling safety system so that periodic tests of its functionality and in-service inspections can be conducted, including tests of

a) the strength and tightness of this system,
b) the active functions of the system’s components and
c) functions of this system as a whole or functions of its individual testable parts.

(4) Nuclear installation design shall set requirements for systems for cleaning the primary circuit coolant of impurities and radioactive materials, including the removal of corrosion and fission products, so that the acceptance criteria set by nuclear installation design for the chemical regime of the primary circuit are complied with and operation is possible in the event of nuclear fuel leakage accepted in nuclear installation design.

(5) Nuclear installation design shall ensure that safety systems providing for removal of residual heat from the core and from the decay of fission products and accumulated heat of components

a) perform their function independently from energy source outside the nuclear installation,
b) ensure removal of residual heat from the core after nuclear reactor shutdown and during the subsequent period so that nuclear fuel and primary circuit design limits are not breached in the event of a single failure in this system when one of the parts of this system is simultaneously inoperable due to repair and
c) ensure monitoring of its functions.

(6) The design of systems, structures and components of the primary circuit system in nuclear installation design shall provide the operators with diversion and alternative means and make it possible to carry out organisational measures for

a) emergency cooling of the core and removal of residual heat from the nuclear reactor in a situation where the function of the core cooling safety system has been completely lost due to a common-cause failure and
b) depressurisation of the primary circuit and prevention of the core from starting to melt under high coolant pressure in accident conditions.

(7) Nuclear installation design shall provide for diversion and alternative means for the system for removal of residual heat from the core and storage pool so that at least one of them is effective after the occurrence of area characteristics and internal events that are more severe than those included in elementary design basis.

§ 39

Information and management systems

(1) Nuclear installation design shall set requirements for information and management systems allowing to monitor, measure, record, process and control operational parameters, technological processes and systems relevant to nuclear safety, radiation protection, radiation situation monitoring, radiological emergency management and security in all states of the nuclear installation.

(2) Nuclear installation design shall require that nuclear installations be equipped with information systems providing, recording and processing in accident conditions information

a) about the current state of the nuclear installation and the course of events, in particular the parameters and states of systems that may affect the progress of the fission reaction or integrity of the core, the primary circuit and the containment vessel and its related systems, and
b) allowing to predict the dispersion of radioactive material and ionising radiation outside the nuclear installation to make it possible to manage radiological accident response.

(3) Nuclear installation design shall set requirements for the reliability of information and control systems and for the method, periodicity and standard of verification of the state of these systems.

(4) Nuclear installation design shall ensure verification of the state of components of information and management systems for which high reliability is required in the nuclear installation design by means of

a) in-service continuous diagnostics or periodic testing, or

b) periodic testing when the nuclear reactor is shut down, if there is no safe method of in-service testing.

(5) Nuclear installation design shall set requirements for tell-tales and controls so that sufficient information about the operation of the nuclear installation is constantly available to operators to be able to intervene if necessary.

(6) Nuclear installation design shall set requirements for information and management systems so that they signal deviations of important operational parameters from permissible tolerances.

§ 40

Protection systems

(1) The design of nuclear installations with a nuclear reactor shall set requirements for protection systems.Protection systems shall

a) be able to recognise abnormal operation and design basis accidents,
b) automatically activate safety systems for the management of abnormal operation and design basis accidents, including the execution system for a rapid nuclear reactor shutdown,
c) enable nuclear installation operators to use a backup system for manual activation of protection system interventions envisaged in nuclear installation design,
d) be separated from management systems;interconnection between protection and control systems is permissible, unless it negatively affects nuclear safety,
e) be designed so that in the event of a conflict their interventions override the operations of control systems and interventions by operators to an extent making it possible to meet the requirement under point (f),
f) perform the automatic functions of protection systems without preventing nuclear installation operators from correctional interventions in accordance with emergency regulations and severe accident management guidelines,
g) be highly reliable and backed up so that a single failure does not cause a loss of the function of the protection system,
h) be designed so that a breakdown, testing or disabling of a channel consisting of a component or functional backup chain from the sensor to signal processing (hereinafter referred to as ‘channel’) does not reduce the number of operable channels backing up each other to a single channel,
i) have a sufficient number of independent channels to ensure that a single failure does not cause a loss of the function of the protection system,
j) have their common processing circuitry for signals backing up each other designed so that their failure cannot cause a loss of the function of the rapid nuclear reactor shutdown system and
k) be designed so as to minimise threats to protection system functions, including in the event of common-cause failures in protection systems that cannot be identified in advance.

(2) Requirements for and settings of the protection system shall be specified in nuclear installation design so that the design criteria and design limits for nuclear fuel cannot be exceeded.

(3) The design of protection systems in nuclear installation design shall be such as to allow

a) periodic testing of the function of each channel while the nuclear reactor is in service and
b) testing of common processing circuitry for signals backing up each other when the nuclear reactor is shut down.

(4) The design of protection systems in nuclear installation design shall be such as to enable the nuclear installation operators to achieve a safe state of the nuclear installation or stabilised subcritical state when failures of the system's components are detected using continuous automatic diagnostics or when conditions arise that make it impossible for its safety functions to be performed appropriately.

(5) If digital programmable resources are used in the protection system, nuclear installation design shall set requirements for the quality and independent assessment thereof.Where the required reliability of the designed safety functions of protection systems cannot be ensured due to low resilience of these systems to common cause failures of software, the function of the protection system shall be backed up using diversion means.

§ 41

Rooms and systems for nuclear installation control

(1) The design of nuclear installations with a nuclear reactor shall comprise reactor control room design.

(2) Nuclear installation design shall provide a reactor control room design that

a) allows for safe access and presence of personnel and health safe environment for reactor control room operators in all states of the nuclear installation in which the function of the reactor control room is required in the nuclear installation design and
b) ensures protection of the reactor control room from the effects of internal events and area characteristics that may jeopardise its operability and habitability as referred to in point (a).

(3) Nuclear installation design shall set requirements for tell-tales of the status of parameters and components and controls of equipment in the reactor control room so that

a) they take into account the human factor and ergonomic requirements for user interfaces for reactor control room operators,
b) reactor control room operators have information about
    1. the operation of the nuclear installation,
    2. automatic interventions from control and protection systems, and
    3. the results of automatic interventions from control and protection systems,
c) reactor control room operators can perform the activities specified in internal regulations and
d) control and management systems provide, by means of tell-tales, visual and audible warnings alerting reactor control room operators of the emergence or change of operational states which deviate from normal operation limits and may affect nuclear safety and radiation protection of the nuclear installation.

(4) Nuclear installation design shall set requirements for backup rooms and means of controlling the nuclear installation so that in the event the reactor control room becomes inoperable, the necessary interventions by reactor control room operators are ensured in operational states, under the conditions of design basis accidents and after a design basis external event

a) to shut down the nuclear reactor,
b) to keep the nuclear reactor in a safe state,
c) to remove residual heat from the nuclear reactor and storage pool, and
d) to monitor the state of the nuclear installation.

(5) The backup room shall

a) as far as reasonably practicable, be physically and electrically separated from the reactor control room,
b) be designed so as to ensure safe access and presence of personnel in this room and health safe environment for operators of the reactor control room in situations for which the backup room is intended in nuclear installation design and
c) satisfy the requirements under paragraph (3)(b) and (c) and provide the functions of a backup room to the extent provided for in nuclear installation design.

§ 42

Power supply systems

(1) For systems important for the operation of the nuclear installation, nuclear installation design shall provide a system of electricity supply sources that are independent from each other so that the possibility of a failure of power supply for systems, structures and components relevant to nuclear safety is excluded as far as reasonably practicable.

(2) Nuclear installation design shall set requirements for electricity supply sources in accordance with paragraph (1) so that

a) systems, structures and components relevant to nuclear safety can perform the functions assigned to them,
b) systems, structures and components backing up each other are independent from each other in terms of power supply and
c) the power supply source itself is reliable and has the capacity to meet
   1. the design limits for power supply systems in operational states and
   2. the safety functions in accordance with the requirements of nuclear installation design.

(3) The design of nuclear installations with a nuclear reactor shall set requirements for power supply systems so that

a) it is ensured, as far as reasonably practicable, that an electricity distribution failure outside the nuclear installation does not affect
   1. the nuclear installation’s power output system,
   2. the nuclear installation’s operating power supply system,
   3. the system of backup power supply for the nuclear installation’s own consumption and
   4. the performance of basic safety functions,
b) an emergency power supply source is available for selected equipment, which is readily available, reliable, autonomous and testable in service (hereinafter referred to as ‘emergency power supply source’) capable of providing power for the period necessary to ensure reliable function of the systems required to manage the situations specified in the design basis,
c) the emergency power supply source can perform its safety function in the event a single failure in the system of emergency power supply sources occurs simultaneously with a loss of external power supply,

d) the loading of the emergency power supply source by connecting the individual appliances is conducted in a controlled manner and it is not overloaded,
e) in a situation where the number of autonomous emergency power supply sources is lower than the number of independent safety systems of the same type that are backing up each other does not reduce the reliability and independence of safety systems and
f) other diversion and alternative power supply sources are available supplying power to systems, structures and components intended for managing situations triggered by extreme area characteristics and internal events falling within the scope of design extended conditions, in accordance with the procedures for managing these situations set out in nuclear installation design.

(4) Nuclear installation design shall specify selected equipment and systems, structures and components other than selected equipment for which, in order to ensure nuclear safety, continuous power supply and means of direct or alternating current supply from accumulators need to be provided.Nuclear installation design shall set the capacity of continuous power supply accumulators taking the conservative approach, with a view to the necessary supply period and output so that the safety functions specified in nuclear installation design are ensured until the accumulators can be recharged.

(5) Nuclear installation design shall require that the power supply system for selected equipment be equipped with monitoring and information systems which

a) provide operators with information about the status and important electrical parameters of the power supply system and
b) can ensure and localise a failure of the power supply system and its components.

(6) The design of nuclear installations with a nuclear reactor whose thermal output exceeds 50 MW, which are used for electricity generation, shall contain a proposal for the method of ensuring supply for the nuclear installation's own consumption from its own turbine generator in the event that power supply from the external grid is interrupted and the output of the turbine generator cannot be transferred to the external grid.

Containment system

§ 43

(1) Nuclear installation design for nuclear installations with a nuclear reactor whose thermal output exceeds 50 MW shall comprise the design of a containment system capable of

a) ensuring protection of the nuclear reactor against
   1. the effects of area characteristics and
   2. man-induced events and
b) preventing radioactive release outside the nuclear installation.

(2) Nuclear installation design shall require that the containment system consist of a hermetically sealed envelope enclosing a hermetically sealed area and protect

a) the nuclear reactor and systems, structures and components of the primary circuit and the parts of the energy conversion system inseparable from the primary circuit, and
b) objects located in the hermetically sealed area
   1. parts of the safety systems and
   2. storage pools.

(3) Nuclear installation design shall require that the containment system also consist of systems ensuring

a) separation of the hermetically sealed area from outer piping systems at points where they intersect and hermetic closing of passages leading to the hermetically sealed area,
b) pressure and temperature control in the hermetically sealed area,
c) handling and controlled removal of fission products, hydrogen, oxygen and other substances produced by fission reaction, during irradiation and chemical reactions in accident conditions in order to prevent their release outside the nuclear installation,
d) active protection of the hermetically sealed area against area characteristics and man-induced events, and
e) management of severe accidents involving the melting of nuclear fuel in the hermetically sealed area.

(4) In order to ensure and protect the functions of the containment system, nuclear installation design shall set

a) acceptance criteria comprising design limits for
   1. the temperature and pressures inside the containment vessel,
   2. tightness of the containment vessel and
   3. tolerable deformation of the containment vessel structure and
b) technical and organisational measures against exceeding the acceptance criteria set out in point (a) taken
   1. in the event of a design basis accident and under design extended conditions without serious damage to nuclear fuel for the period until measures necessary to achieve a safe state of the nuclear installation are applied and
   2. after the occurrence of a severe accident, at least for the period needed for taking measures to manage the severe accident and radiological emergency.

(5) Nuclear installation design shall comprise a design of systems for separation of the hermetically sealed area so that in the event of a design basis accident the separation of systems placed inside the hermetically sealed area from the rest of the nuclear installation is ensured using a system of testable separation elements.

§ 44

(1) Nuclear installation design shall require that in the event of a design basis accident the containment system can limit the consequences of a detected bypass of the boundary of the hermetically sealed area using separation elements.Every piping route passing the boundary of the hermetically sealed area, which

a) forms part of the primary circuit or is connected directly with the atmosphere in the hermetically sealed area, shall be separable and equipped with two independently controllable separating elements arranged in series, one inside and the other outside the containment vessel, and
b) does not form part of the primary circuit or is not connected directly with the atmosphere in the hermetically sealed area, shall have one separating element placed outside the hermetically sealed area.

(2) Nuclear installation design shall provide for the possibility of separating the hermetically sealed area from the external environment and systems outside the area under design extended conditions.

(3) Nuclear installation design shall set requirements so that a severe accident in the hermetically sealed area is a practically excluded event during an operational state with the nuclear reactor shut down and the hermetically sealed area open.

(4) Nuclear installation design shall set requirements for pipe and cable lead-throughs at the boundary of the hermetically sealed area so that

a) radioactive release from the hermetically sealed area is as limited as possible,
b) they are protected from the effects of
   1. reactive forces and
   2. failures of other components and
c) the separation valves of pipe lead-throughs are placed as close as possible to the wall of the boundary of the hermetically sealed area and
   1. their state is detectable and testable in every situation and
   2. their control is backed up.

(5) Nuclear installation design shall require that the containment system be equipped with means allowing persons to enter the hermetically sealed area during operation, while maintaining its tightness.

(6) Nuclear installation design shall specify ventilation routes between the individual parts of the hermetically sealed area, which shall prevent

a) local accumulation of the explosive gases being produced and
b) damage to the boundary of the hermetically sealed area or equipment inside the hermetically sealed area due to pressure differences arising under accident conditions.

§ 45

(1) Nuclear installation design shall set requirements for tightness, strength and functionality testing of the containment system and its individual parts during and after the construction of the nuclear installation, periodically during operation and after repair of its individual systems, structures and components

a) to verify compliance with acceptance criteria,
b) to detect defects, failures and levels of degradation of the individual systems, structures and components, and
c) to obtain support information for the application of corrective measures corresponding to the shortcomings detected.

(2) Nuclear installation design shall set requirements for the safety system for removal of heat from the containment system, which shall, together with other containment systems, reduce the pressure and temperatures inside the hermetically sealed area, under accident conditions and after reaching a stabilised subcritical state of the nuclear reactor, to the level set by nuclear installation design.

(3) Nuclear installation design shall require that the systems referred to in § 43(3)(c) can, together with other systems of the nuclear installation,

a) reduce the activity concentration of radionuclides in the hermetically sealed area and modify the composition and form of fission reaction products as necessary for further management thereof and
b) monitor the volume concentration of explosive gases produced under accident conditions and reduce it so that the integrity of the hermetically sealed area is not jeopardised by combustion or explosion thereof.

(4) Nuclear installation design shall set requirements for diversion and alternative means and procedures to protect the integrity of the containment system in the event of melting of the core that shall make it possible, as much as reasonably practicable,

a) to keep the core melt inside the hermetically sealed area of the containment vessel,

b) to suppress reactivity in the core melt,
c) to provide for long-term cooling of the core melt by transferring heat to the system for the removal of heat from the containment vessel and
d) to maintain the capability of the containment system to keep radioactive materials inside the hermetically sealed area of the containment vessel.

(5) Covers, thermal insulation and coating of structures and components inside the hermetically sealed area that are included in nuclear installation design shall be designed for design basis accidents and design extended conditions and

a) shall prevent jeopardising of the safety functions of containment systems and
b) if damaged, shall not have a negative effect on containment systems during the states of the nuclear installation envisaged in nuclear installation design.

§ 46

Auxiliary and support services and systems

(1) Nuclear installation design shall set requirements for auxiliary and support services and systems.

(2) The auxiliary and support services and systems referred to in paragraph (1) include

a) autonomous systems for the removal of heat from the surrounding environment to ensure the function of the safety systems for the removal of residual heat from the core, the storage pool, the containment vessel and from selected equipment and other equipment relevant to nuclear safety in operational states and in the event of basic design basis accidents;these systems shall be designed so as to ensure
   1. reliable implementation of the safety function by backing up systems, structures and components of the autonomous heat removal systems relevant to nuclear safety, including power supply from emergency power supply sources,
   2. detection of penetration of radioactive materials into the heat removal systems and
   3. facilities for preventing radioactive release outside the nuclear installation,
b) ventilation, air-conditioning and filtration systems, which, in operational states and during design basis accidents, maintain the conditions specified in nuclear installation design in premises where systems, structures and components relevant to nuclear safety are located, and
c) others system providing services or media for keeping systems relevant to nuclear safety operable, in particular
   1. power supply,
   2. water,
   3. compressed air,
   4. propellants,
   5. lubrication or
   6. industrial gases.

(3) At least one of the systems referred to in paragraph (2)(b) shall

a) prevent dissemination of aerosol of radioactive materials or hazardous substances leaking from facilities in nuclear installation premises intended for this purpose in the nuclear installation design and reduce their concentrations to a level that complies with the requirements for accessibility of the service areas of the nuclear installation,
b) prevent radioactive release outside the nuclear installation or keep this release as low as reasonably practicable,

c) ensure that the environmental conditions in nuclear installation premises are as specified in nuclear installation design and ventilate inert and toxic gases from these premises without disrupting the ability to control the discharge of radioactive material,
d) be equipped with sufficiently efficient filters and allow for testing of their efficiency and
e) ensure compliance of radionuclide discharges from the nuclear installation with the requirements of the Atomic Act.

§ 47

Energy conversion system

(1) Nuclear installation design shall set requirements for the system of conversion of the steam energy produced from nuclear energy to electrical energy (hereinafter referred to as the 'energy conversion system') so that removal of heat from the nuclear reactor in operational states is ensured at the nuclear reactor output levels envisaged in nuclear installation design.

(2) Nuclear installation design shall set requirements for the system of the secondary cooling circuit of the nuclear reactor (hereinafter referred to as the 'secondary circuit'), which shall ensure steam production and extraction and feedwater supply in the energy conversion system so that, in abnormal operation and under accident conditions, separation of the energy conversion system from the primary circuit and from the parts of the system outside the hermetically sealed area is ensured using selected equipment.

(3) Nuclear installation design shall set requirements for selected equipment which forms part of the energy conversion system so that

a) the performance of its safety functions is ensured and
b) structures and components of this system relevant to nuclear safety are protected against internal events and area characteristics.

(4) The design of the energy conversion system in nuclear installation design shall

a) ensure monitoring of the levels of radioactive releases from the primary circuit into the energy conversion system and
b) allow for limiting further dissemination of radioactive materials outside the energy conversion system to prevent radiological incidents or radiological accidents.

PART SIX

TECHNICAL MEANS OF ENSURING RADIATION PROTECTION

§ 48

(1) Nuclear installation design shall set requirements for the technical means of ensuring radiation protection needed for

a) analysis of processes and activities in terms of radiation protection,
b) identification of sources of ionising radiation and radioactive materials, including the activation and corrosion products being generated, and
c) control of transport of sources of ionising radiation and radioactive materials in nuclear installation systems and in the working environment.

(2) Nuclear installation design shall set requirements for equipment of the nuclear installation with means enabling control of gas and liquid discharges and management of radioactive waste, including containment and storage areas.

(3) The nuclear installation's construction materials and media chosen in nuclear installation design shall ensure that the generation of activation and corrosion products is as low as reasonably practicable.

(4) The premises of the nuclear installation shall be designed so as to

a) optimise the exposure of workers,
b) prevent radioactive release from systems,
c) prevent contamination of the workplace and dispersion of radioactive material into the atmosphere in the workplace and
d) prevent radioactive release outside the nuclear installation,
e) create barriers preventing dissemination of radioactive material and contamination of persons and objects,
f) to classify and divide the premises of the nuclear installation according to the radiation situation in operational states and under accident conditions and mark them appropriately to prevent unintentional exposure,
g) to restrict the access of personnel to premises with unfavourable radiation situation,
h) ensure that equipment which is frequently attended or maintained is preferably located in areas with a favourable radiation situation and
i) provide sufficient means and number of points with enough capacity to
    1. measure the contamination of persons and objects,
    2. decontaminate persons and objects, and
    3. decontaminate parts of the nuclear installation.

§ 49

(1) Nuclear installation design shall require that nuclear installations be equipped with stationary and mobile means for radiation situation monitoring that can signal exceedance of the set monitoring levels

a) in operational states,
b) in the event of design basis accidents and
c) as far as reasonably practicable, under design extended conditions.

(2) Nuclear installation design shall require that stationary monitoring systems report information about the measured quantities to the reactor control room, the radiation control room and the emergency control centre or technical support centre.Stationary monitoring systems shall ensure, in all states of the nuclear installation, the monitoring of

a) dose rates in areas with an unfavourable radiological situation that are normally accessible to operators,
b) activity concentrations of radioactive materials in the atmosphere in rooms normally accessible to operators where the set monitoring levels could be exceeded,
c) surface contamination of persons and items at points of exit from the controlled area and
d) activity concentrations of radioactive materials in the systems of the nuclear installation, in particular in the gas cleaning system and the discharge system.

(3) Nuclear installation design shall require that nuclear installations be equipped with

a) a laboratory for measuring the activity of samples of gases and liquids taken in the systems of the nuclear installation,
b) a system for monitoring external exposure and contamination of persons, and
c) systems for balancing discharges of radioactive material into air and waterflows.

(4) Nuclear installation design shall set requirements for monitoring of the impacts of the operation of the nuclear installation on the surrounding area and early detection of any radioactive releases outside the nuclear installation by monitoring

a) the dose rates at the boundary of the guarded area and in the emergency planning zone and
b) the activity of radionuclides in discharges from the nuclear installation.

(5) Nuclear installation design shall set requirements for technical means and conditions for ensuring radiation protection so as to satisfy the requirements of the implementing decrees concerning radiation protection and security of radionuclide sources and the implementing decree on radiation situation monitoring.

PART SEVEN

RADIOLOGICAL EMERGENCY MANAGEMENT

§ 50

(1) The design of nuclear installations with a nuclear reactor whose thermal output exceeds 100 MW shall ensure that the nuclear installation is equipped with

a) shelters,
b) an emergency control centre,
c) a technical support centre,
d) a backup technical support centre,
e) a backup emergency control centre and
f) an external emergency support centre.

(2) Nuclear installation design shall require that the emergency control centre and technical support centre referred to in paragraph (1) be placed in shelters or special premises of the nuclear installation.

(3) The nuclear installation design referred to in paragraph (1) shall ensure that shelters

a) are located within the nuclear installation site,
b) are seismically and functionally resistant to design basis external events and, for design extended conditions, to the corresponding area characteristics evaluated taking the realistic approach in accordance with § 12(3),
c) provide protection against the effects of ionising radiation, including ionising radiation caused by a severe accident,
d) have enough capacity to shelter all personnel of the nuclear installation participating in radiological emergency response management and implementation for a period of no less than 72 hours,
e) allow for keeping record of and checking the persons entering the shelter with regard to ensuring physical protection by the physical protection control centre using a backed-up communication system,
f) allow for conducting dosimetric checks and decontamination of the persons entering the shelters,
g) provide a communication link via two independent technical systems between shelters and with persons managing the response to the radiological emergency at assembly points or other shelters,
h) allow for administration of first aid to persons entering the shelters,

i) are equipped with
   1. filtration and ventilation equipment providing protection against the penetration of radioactive materials,
   2. an oxygen regeneration system,
   3. CO2 concentration analysers,
   4. backup power supply system,
   5. emergency potable and non-potable water supply for a minimum of 72 hours,
   6. emergency lighting,
   7. portable radiation situation monitoring equipment,
   8. personal protection equipment and a package of iodine prophylaxis for the maximum number of sheltered persons and
   9. storage areas for the equipment referred to in points 5, 7 and 8.

§ 51

(1) The design of the nuclear installations referred to in § 50(1) shall ensure that the shelters or special premises, in which the emergency control centre and technical support centre are located,

a) are permanently operable, including in the event of a complete power supply failure in the nuclear installation and under design extended conditions,
b) are habitable under design extended conditions,
c) provide a communication link via two independent technical systems with
   1. the reactor control room and the backup room, and
   2. persons responding to an emergency which has occurred or a crisis situation referred to in other legislation outside the nuclear installation site and
d) provide an audiovisual communication link with
   1. the reactor control room,
   2. the backup room and
   3. organisational units and personnel involved in radiological emergency management.

(2) The nuclear installation design shall ensure that space is available in shelters for storing

a) food reserves for the maximum number of sheltered persons for at least 72 hours after the start of sheltering, in the case of shelters intended for individuals involved in radiological emergency response or shelters where
   1. the emergency control centre or
   2. the technical support centre are located and
b) the means necessary for conducting interventions at the nuclear installation, in the case of shelters intended for persons involved in radiological emergency response.

§ 52

The design of the nuclear installations referred to in § 50(1) shall ensure that, throughout the period of managing accident conditions and ensuring response to a radiological emergency, the shelter is equipped to allow for

a) declaring a radiological accident and notifying the authorities concerned,
b) alerting persons on the nuclear installation site or the population in the emergency planning zone,
c) managing the evacuation of persons from the nuclear installation site,
d) keeping record of and managing the control, evaluation and regulation of exposure of individuals involved in radiological emergency response at the nuclear installation site,

e) proposing to the president of the region the introduction of urgent action to protect the population in the emergency planning zone in the form of evacuation,
f) informing the authorities concerned and the persons specified in the internal emergency plan referred to in § 157(2)(h) of the Atomic Act,
g) informing the population in accordance with § 157(2)(i) of the Atomic Act,
h) managing radiation situation monitoring in the emergency planning zone in accordance with § 157(2)(j) of the Atomic Act,
i) continuously evaluating the results of radiation situation monitoring and
j) transmitting radiation situation monitoring data to the Office by means of remote access in accordance with § 157(2)(j) of the Atomic Act and in the manner referred to in § 21(1)(g), point 2, of the implementing decree concerning the details of ensuring radiological emergency management.

§ 53

The design of the nuclear installations referred to in § 50(1) shall ensure that the shelter or special premises, in which the technical support centre is located,

a) are separated from the reactor control room and the backup room and
b) allow for
   1. throughout the period of managing accident conditions and ensuring radiological emergency response, access by the technical support centre operators to information from sources of immediate and archival data needed for managing accident conditions and ensuring radiological emergency response,
   2. the provision of technological data and information needed to estimate the composition and activity of released radionuclides over time,
   3. the provision of data from radiation situation monitoring inside and at the boundary of the guarded area and in the emergency planning zone,
   4. audiovisual monitoring of technological facilities and monitoring of interventions made in the context of responding to the accident conditions that have arisen and the radiological emergency at the nuclear installation, and
   5. early evaluation of the state of the nuclear installation and the necessary safety functions under accident conditions.

§ 54

(1) The design of the nuclear installations referred to in § 50(1) shall ensure that the backup emergency control centre, backup technical support centre and the external emergency support centre

a) are not affected by design extended conditions and
b) serve their functions in the event of occurrence of area characteristics that could lead to a loss of functionality of the centres they are backing up.

(2) The design of the nuclear installations referred to in § 50(1) shall also ensure that the external emergency support centre

a) has its own power supply system,
b) can be equipped with
   1. means of communication,
   2. personal protective equipment and
   3. water and food, and,
c) throughout the period of managing accident conditions and ensuring response to a radiological emergency, allows for

1. continuous evaluation of the radiation situation that has arisen based on situation monitoring conducted in the emergency planning zone,
2. ongoing production of forecasts of radiation situation developments in the emergency planning zone and
3. the conduct of dosimetric checks and decontamination of persons entering the centre.

(3) The design of the nuclear installations referred to in § 50(1) shall ensure that the backup emergency control centre allows for

a) the activities of the emergency control centre to be carried out in the event the emergency control centre becomes dysfunctional or inoperable,
b) irrespective of the state of the emergency control centre and within a scope similar to that in the emergency control centre, continuous access by operators of the backup emergency control centre to data on
   1. the state of the nuclear installation and
   2. the situation on the nuclear installation site and
c) communication with all working groups involved in the management of the radiological accident.

(4) The design of the nuclear installations referred to in § 50(1) shall ensure that the backup technical support centre allows for

a) the activities of the technical support centre to be carried out in the event the technical support centre becomes dysfunctional or inoperable,
b) irrespective of the state of the technical support centre and within a scope similar to that in the technical support centre, continuous access by personnel of the backup technical support centre to data on the situation on the nuclear installation site and
c) communication with reactor control room or backup room operators.

PART EIGHT

SECURITY

§ 55

Nuclear installation design shall set requirements for nuclear installations so that security is ensured in accordance with the requirements set out by the Atomic Act, the implementing decree concerning security of nuclear installations and nuclear materials and the implementing decree concerning radiation protection and security of radionuclide sources.

PART NINE

DOCUMENTATION FOR LICENSED ACTIVITIES

§ 56

Preliminary safety report

The contents of the preliminary safety report are laid down in Annex 2 to this Implementing Decree.

§ 57

Operating safety report

(1) The contents of the operating safety report are laid down in Annex 3 to this Implementing Decree.The operating safety report for nuclear installations without a nuclear reactor and for research nuclear installations shall contain the information referred to in Annex 3 to this Implementing Decree to the extent applicable to the nuclear installation.

(2) The contents of the operating safety report for the first physical start-up of nuclear installations with a nuclear reactor, the first power-generation start-up of nuclear installations with a nuclear reactor or the operation of nuclear installations with a nuclear reactor are further detailed in Annex 4 to this Implementing Decree.

PART TEN

FINAL PROVISIONS

§ 58

Notification

This Implementing Decree was notified in accordance with Directive (EU) 2015/1535 of the European Parliament and of the Council of 9 September 2015 laying down a procedure for the provision of information in the field of technical regulations and of rules on Information Society services.

§ 59

Entry into force

This Implementing Decree shall enter into force on …… 2017.

Chairperson:

Annex 1 to Implementing Decree No .../2017

Safety classes and criteria for classifying selected equipment into safety classes

1. Criteria for classifying selected equipment into safety classes for nuclear installations comprising a nuclear reactor:
   1.1. Selected equipment performing the passive safety function of a primary circuit boundary and designed to such a standard that its failure is a practically excluded event shall be classified as safety class 1 selected equipment, including in cases where design measures are in place for managing design basis accidents caused by its failure.
   1.2. Selected equipment performing active and passive safety functions with highest reliability requirements shall be classified as safety class 2 selected equipment.In the case of nuclear installations with a nuclear reactor, such equipment includes
      1.2.1. components performing the safety function of nuclear fuel cladding,
      1.2.2. selected equipment not falling under safety class 1 performing the safety function of a primary circuit pressure boundary,
      1.2.3. selected equipment performing the safety functions of the safety system of which it is part, namely the functions
         1.2.3.1. for rapid nuclear reactor shutdown as necessary to prevent the development of accident conditions in the reactor in the event of abnormal operation,
         1.2.3.2. for rapid nuclear reactor shutdown needed to mitigate the consequences of design basis accidents,
         1.2.3.3. for keeping a sufficient quantity of coolant for cooling the core during design basis accidents not involving a breach of the primary circuit pressure boundary and after the causes for these accident conditions have disappeared,
         1.2.3.4. for the removal of heat from the core and to limit damage to nuclear fuel in the event of a design basis accident involving a breach of the primary circuit boundary,
         1.2.3.5. necessary for the removal of residual heat from the core during operational states and in the event of a design basis accident not involving a breach of integrity of the primary circuit boundary,
         1.2.3.6. necessary for limiting radioactive releases from the hermetically sealed envelope during accident conditions and after a stabilised subcritical state of the nuclear installation has been achieved in the event of a design basis accident,
         1.2.3.7. necessary for energy supply or control of the operation of selected equipment classified in safety class 2 when it performs its safety functions,
         1.2.3.8. of a protection or information control and management system, if
            1.2.3.8.1. the safety function is required to achieve a stabilised subcritical state, to prevent the occurrence of an accident more severe that a design basis accident and to mitigate the consequences of a design basis accident,
            1.2.3.8.2. the failure or unintentional activation of the function of the selected equipment could lead to undesirable consequences and there is no other safety class 2 selected equipment with a function that would

prevent the development of accident conditions that are more severe than a design basis accident, or

1.2.3.8.3. the safety function would be necessary to obtain information essential for operators to carry out activities necessary to achieve a stabilised subcritical state of the nuclear installation.

1.3. Selected equipment not classified in safety class 1 or 2 performing safety functions of the system of which they are part shall be classified as safety class 3 selected equipment.In the case of nuclear installations with a nuclear reactor, these include safety functions

1.3.1. for preventing unacceptable changes in reactivity,

1.3.2. for maintaining the nuclear reactor in safe shutdown conditions after all activities that led to its shutdown and after each shutdown,

1.3.3. for maintaining a sufficient quantity of the coolant for cooling the core of the nuclear reactor in all operational states considered in nuclear installation design,

1.3.4. for the removal of heat from safety systems into the surrounding environment, unless a loss of their function restricts the performance of the functions referred to in points 1.2.3.4 and 1.2.3.5, which are necessary for achieving and keeping the nuclear reactor in a stabilised subcritical state,

1.3.5. for limiting radioactive release from the hermetically sealed envelope under design extended conditions,

1.3.6. for keeping the exposure of nuclear installation personnel and population below the set reference levels in the event of a radiological emergency under accident conditions, including events which may result in radioactive releases and dissemination of ionising radiation from sources of ionising radiation located outside the containment system,

1.3.7. for maintaining the environmental conditions necessary for the operation of safety systems and for allowing nuclear installation operators access to carry out activities relevant to nuclear safety, radiation protection, technical safety, radiation situation monitoring, radiological emergency management and security inside the nuclear installation,

1.3.8. for preventing releases of radioactive substances outside the nuclear reactor from irradiated nuclear fuel transported or stored inside the nuclear installation during operational states,

1.3.9. for removing outside the nuclear reactor decay heat from irradiated nuclear fuel stored inside the nuclear installation,

1.3.10. for keeping subcritical the irradiated nuclear fuel stored inside the nuclear installation outside the primary circuit,

1.3.11. for controlling radioactive material discharges in operational states,

1.3.12. for energy supply or control of the operation of selected equipment classified in safety class 3 when it performs its safety functions,

1.3.13. for ensuring the operability of other selected equipment when it performs its safety functions, with the exception of energy supplies or control of its operation,

1.3.14. for preventing or mitigating the consequences of failures of selected equipment, if these could lead to disruption of the performance of its safety functions,

1.3.15. for substituting the safety functions of selected equipment classified in safety classes 2 or 3 by diversion means when its function is lost due to a common-cause failure,

1.3.16. of control and management systems that manage or enable operators to manage the operation of the nuclear installation so that the parameters of the nuclear installation are maintained within the limits set by nuclear installation design, if

1.3.16.1. after a stabilised subcritical state of the nuclear installation has been achieved, these control and management systems are necessary to achieve and maintain a safe state of the nuclear installation or prevent an undesirable development of accident conditions,

1.3.16.2. safety class 2 selected equipment would have to be activated to remedy the consequences of incorrect function of these control and management systems,

1.3.16.3. the function of these control and management systems significantly limits the frequency of interventions from selected equipment classified in safety class 2 when managing abnormal operation,

1.3.16.4. these control and management systems are the only means for controlling the capability of safety class 2 selected equipment to perform the safety functions assigned to them,

1.3.16.5. the functions of these control and management systems are the only means for managing a monitored operating parameter of the nuclear installation,

1.3.16.6. these control and management systems perform other functions which

1.3.16.6.1. correspond to the technical specifications referred to in point 1.3.15,

1.3.16.6.2. are used to prevent or limit the consequences of minor releases of radionuclides outside the nuclear installation or

1.3.16.6.3. are necessary for monitoring and signalling of the occurrence and consequences of internal events and parameters of area characteristics negatively affecting the level of assurance of nuclear safety, radiation protection, technical safety, radiation situation monitoring, radiological emergency management and security, or

1.3.17. of structures and components of the energy conversion system, in particular the secondary circuit, a failure of which may have a negative effect on the level of assurance of nuclear safety, radiation protection and technical safety, if not classified in safety class 2 in accordance with point 1.2.3.5 and if the pressure of the working fluid at calculation temperature 100 °C exceeds 4 MPa and the piping diameter is greater than DN200.

2. Criteria for classifying selected equipment into safety classes in the case of nuclear installations for the management of radioactive waste:

2.1. Packaging for storing radioactive waste from reprocessed nuclear fuel and performing the safety function of a physical safety barrier shall be selected equipment classified in safety class 2.

2.2. Selected equipment performing the safety function of a physical safety barrier and selected equipment performing safety functions necessary for preventing radioactive releases or dissemination of ionising radiation into the environment and work environment during any of the states of the nuclear installation envisaged in the nuclear installation design shall be selected equipment classified in safety class 3.

3. Criteria for classifying selected equipment into safety classes in the case of nuclear installations for storing spent nuclear fuel:

3.1. Packaging performing the safety function of a physical safety barrier in storage of spent nuclear fuel shall be selected equipment classified in safety class 2.

3.2. Selected equipment performing the safety function of ensuring subcriticality of nuclear material in a wet nuclear fuel storage facility shall be selected equipment classified in safety class 2.

3.3. Selected equipment performing the safety function of a physical safety barrier and selected equipment performing safety functions preventing the occurrence of a radiological emergency during any of the operational states of the nuclear installation envisaged in the nuclear installation design, including selected equipment monitoring the parameters of packaging for storing spent and irradiated nuclear fuel proving compliance with limits and conditions, shall be selected equipment classified in safety class 3.

4. Criteria for classifying selected equipment into safety classes in the case of nuclear installations for the disposal of radioactive waste and spent nuclear fuel and for the production, processing, storage and disposal of radioactive or fissile material:

4.1. Packaging performing the safety function of a physical safety barrier for the disposal of spent and irradiated nuclear fuel and radioactive waste generated from reprocessed nuclear fuel shall be selected equipment classified in safety class 2.

4.2. Selected equipment performing the safety function of keeping nuclear material subcritical shall be selected equipment classified in safety class 2.

4.3. Selected equipment performing the safety function of a physical barrier for preventing the occurrence of a radiological emergency when disposing of radioactive waste and spent nuclear fuel and in the production, processing, storage and disposal of nuclear material shall be selected equipment classified in safety class 3.

5. Additional criteria for classifying selected equipment into safety classes:

5.1. Where a part of selected equipment performs a less significant safety function, it shall be classified in a safety class according to the safety function it performs.

5.2. Where multiple units of selected equipment can perform the same safety function simultaneously, selected equipment intended in nuclear installation design to perform this safety function shall be classified in a safety class according to points 1 to 4.

5.3. The boundaries of safety classes in a piping system which is selected equipment shall be set at the first separating valve, preventing the loss of a safety function of selected equipment due to loss of working fluid, classified in a higher safety class.

5.4. Electrical equipment of emergency power supply systems powering selected equipment classified in safety class 2 shall be selected equipment classified in safety class 2.This electrical equipment may also be used to power selected equipment requiring safety class 3 power supply and control, or equipment that does not need power supply and control from selected equipment, if safety class 2 selected equipment that requires power supply is protected against the consequences of its failure.

5.5. Electrical equipment of emergency power supply systems powering appliances that require power supply and control from selected equipment classified in safety class 3 shall be selected equipment classified in safety class 3.

5.6. The supply circuit breaker of distributors connected in a loop with other distributors that are selected equipment classified in safety class 3, whose terminals are not connected to an appliance requiring power supply from selected equipment, shall be selected equipment classified in safety class 3.The wiring used to ensure the function of selected equipment shall be selected equipment classified in the same safety class as the selected equipment for which it is intended.

5.7. Selected equipment included among control and management systems shall be classified in the same safety class if intended to perform the same safety function.

5.8. Measuring circuits forming a channel with control circuits and power equipment shall be selected equipment classified in the same safety class as the control circuits and power equipment.

5.9. Where measuring or control circuits of the same channel are classified in different safety classes based on technological functions,

5.9.1. separate parts of the measuring or control channel shall be selected equipment classified in the safety class of the controlled selected equipment and

5.9.2. common parts of the measuring or control circuit shall be classified in the highest safety class of the interconnected selected equipment.

Annex 2 to Implementing Decree No .../2017

Contents of the preliminary safety report

1. The preliminary safety report shall contain
   1.1. basic information about the characteristics of the area for siting the nuclear installation, the nuclear installation design and additional information updating the data in the initial safety report,
   1.2. information about compliance with the requirements for nuclear safety and nuclear installation design set out in legislation and in the documentation for the licensed activity, which is the construction of a nuclear installation;justification shall be provided for any deviations from the documentation for the licensed activity, which is the siting of a nuclear installation,
   1.3. for systems, building and machinery structures, components and equipment, information comprising
      1.3.1. a description of the design of systems, building and machinery structures, components or equipment,
      1.3.2. the design basis for the design of systems, structures or components,
      1.3.3. an overview of all the requirements applied in nuclear installation design for systems, building and machinery structures, components or equipment with regard to nuclear safety, radiation protection, radiation situation monitoring, radiological emergency management, security and non-proliferation of nuclear weapons, and
      1.3.4. evidence of compliance of the nuclear installation design with the requirements under point 1.3.3,
   1.4. the parameters used in nuclear installation design for the assessment of the installation’s nuclear and technical safety, reliability and lifetime,
   1.5. for the requirements referred to in point 1.3.3, compliance with which cannot be demonstrated in the preliminary safety report,
      1.5.1. a description of how compliance with these requirements will be demonstrated and
      1.5.2. a list of documentation containing the evidence referred to in point 1.5.1,
   1.6. a description of the nuclear installation,
   1.7. a description of the basic systems of the nuclear installation,
   1.8. a description of the processes applied and evidence of nuclear safety within the scope of the operating safety report according to Annex 3 to this Implementing Decree;point 1.5 shall apply to requirements, compliance with which cannot be demonstrated, otherwise, information about the future implementation of the relevant safety and technical requirements and objectives shall be provided, and
   1.9. a description of how readiness for radiological accident response will be ensured in the emergency planning zone, if established, and assessment of whether early introduction and complete execution of all urgent protective actions is feasible under the conditions of a radiological accident of the nuclear installation, in particular with a view to the distribution of the population and presence of settlements in the emergency planning zone.

Annex 3 to Implementing Decree No .../2017

Contents of the operating safety report

The operating safety report shall contain

1. updated basic information about the characteristics of the area for siting the nuclear installation, the nuclear installation design and additional information concerning the initial safety report,
2. information about compliance with the requirements for nuclear safety, radiation protection, technical safety, radiation situation monitoring, radiological emergency management and security of the nuclear installation set out in the preliminary safety report;justification shall be provided for any deviations from the preliminary safety report,
3. up-to-date information about the systems, structures and components of the nuclear installation, comprising
   3.1. a description of the design of systems, building and machinery structures, components or equipment,
   3.2. key design basis information for systems, structures or components,
   3.3. an overview of the requirements applied in nuclear installation design for systems, building and machinery structures, components or equipment with regard to nuclear safety, radiation protection, radiation situation monitoring, radiological emergency management, security and non-proliferation of nuclear weapons, and
   3.4. evidence of compliance of the nuclear installation design with the requirements under point 3.3,
4. a description of and justification for changes in the nuclear installation design described in the preliminary safety report, including demonstration that technical design safety has been maintained,
5. an assessment of the results of checks and tests from the stage of construction of the nuclear installation and assessment of the results of additional calculations and measurements arising from the requirements of the preliminary safety report,
6. operational requirements for the nuclear installation with respect to nuclear safety, radiation protection, radiation situation monitoring, radiological emergency management and security, and a description and evidence of compliance with them in all operational states, in the resolution of non-conformities and operational occurrences and in maintenance and repair of the installation,
7. evaluation of the nuclear safety, radiation protection, radiation situation monitoring, security, reliability and lifetime parameters achieved and specification of the method and interval of further monitoring thereof,
8. assessment of the quality and outcomes of each process and compliance with the requirements for nuclear installation design, and
9. a description of the technical means specified in accordance with the implementing decree concerning the details of ensuring radiological emergency management to ensure
   9.1. the declaration of a radiological emergency and notification that it has occurred,
   9.2. management of and response to radiological emergencies,
   9.3. a communication link between the persons managing the radiological emergency response and assembly points, and
   9.4. a communication link as part of the system for the organisation of assembly or sheltering of persons and their departure or evacuation from assembly points or shelters.

Annex 4 to Implementing Decree No .../2017

Contents of the operational safety report for nuclear installations with a nuclear reactor

The operating safety report for the first physical start-up of nuclear installations with a nuclear reactor, the first power-generation start-up of nuclear installations with a nuclear reactor or the operation of nuclear installations with a nuclear reactor shall contain

1. a description of the nuclear installation with a nuclear reactor,
2. a description of the basic systems of the nuclear installation with a nuclear reactor and
3. a description of the processes applied and evidence of nuclear safety, radiation protection, radiation situation monitoring, radiological emergency management and security of the nuclear installation with a nuclear reactor.

The contents of the operating safety report referred to in points 1 to 3 shall include the following information:

1. An introductory part comprising
   a) information about the purpose, preparation and structure of the operating safety report,
   b) information about the licence applicant and the stakeholders,
   c) a general description of the nuclear installation,
   d) a comparison with similar nuclear installation designs and a comparison with the contents of the preliminary safety report,
   e) technical information about new technology incorporated into the nuclear installation design,
   f) information about the operational states of the nuclear installation,
   g) information about the licence applicant's management system,
   h) a summary list of all supporting documents used to prepare the operating safety report,
   i) drawings and other graphic annexes, and
   j) information about the specification and method of implementation of the requirements relating to nuclear safety, radiation protection, technical safety, radiation situation monitoring, radiological emergency management, security and non-proliferation of nuclear weapons.
2. Characteristics of the area for siting the nuclear installation, including
   a) a summary assessment of specific characteristics of the area,
   b) geographic and demographic information,
   c) information about area characteristics and events that may be induced by human activity,
   d) information about internal events that may occur on the nuclear installation site,
   e) results of the assessment of area characteristics in terms of meteorology, hydrology and geological, seismic, hydrogeological and engineering-geological conditions,
   f) information about the radiation situation in the area due to external sources of radiation,
   g) readiness for radiological emergency response in the emergency planning zone, if established, and assessment of whether early introduction and complete execution of all urgent actions to protect the population is feasible under the conditions of a radiological accident of the nuclear installation, in particular with a view to the distribution of the population and presence of settlements in the emergency planning zone, and
   h) information about monitoring of the parameters describing the characteristics of the area for siting the nuclear installation.

3. The design of systems, building and machinery structures, components and equipment, comprising information about
   a) the design basis of the nuclear installation design relating to ensuring nuclear safety,
   b) classification of systems, structures and components into safety classes,
   c) classification of the load on systems, structures and components for specification of the method of protection
      1. in terms of seismicity,
      2. against climatic effects,
      3. against external and internal flooding,
      4. against flying objects and explosions,
      5. against the dynamic effects of postulated breaches of piping systems and
      6. against earthquakes,
   d) the design of building structures in the 1st category of seismic resistance,
   e) the design of machinery systems and components,
   f) seismic and dynamic resistance of machinery, electrical equipment and control and management systems,
   g) environment qualification,
   h) the design of piping systems and
   i) threaded connections.

4. Nuclear reactor, comprising a summary description of the nuclear reactor and information about
   a) the nuclear fuel design,
   b) nuclear characteristics of the core,
   c) thermal and hydraulic characteristics of the core,
   d) nuclear reactor materials and
   e) the design of reactivity control systems.

5. Cooling and related systems of the nuclear reactor, comprising descriptions and characteristics of
   a) the reactor cooling system and the pressure boundary of the cooling circuit,
   b) the pressure vessels of the nuclear reactor,
   c) the main circulating pumps,
   d) the steam generators,
   e) primary circuit piping,
   f) the pressure control system in the primary circuit,
   g) supports and restraints of the components of the nuclear reactor cooling system,
   h) shut-off and separation valves of the nuclear reactor cooling system,
   i) auxiliary systems of the primary circuit and
   j) requirements and measures to allow for operators to access the nuclear reactor cooling system to conduct in-service checks and maintenance.

6. Safety systems, comprising descriptions and characteristics of
   a) the overall concept of safety systems,
   b) the containment system,
   c) the emergency core cooling systems,
   d) systems to ensure conditions for operators' activities and control room habitability,
   e) emergency steam generator power supply systems,
   f) fission product removal and concentration control systems,
   g) the system of emergency removal of the stream-gas mixture from the primary circuit and
   h) other safety systems.

7. Control and management systems, comprising descriptions and characteristics of
   a) the overall concept of control and management systems,
   b) the protection system for the activation of the rapid nuclear reactor shutdown system and for the activation and management of interventions from execution safety systems,
   c) systems to ensure safe shutdown of the nuclear reactor,
   d) information systems relevant to nuclear safety,
   e) other systems relevant to nuclear safety,
   f) management systems engaged in nuclear safety assurance,
   g) the means and measures for diversion initiation and management of safety functions, and
   h) data transmission systems.

8. Electrical systems, comprising descriptions and characteristics of
   a) the overall concept of electrical systems,
   b) the concept of off-site electrical systems,
   c) the concept of on-site electrical systems, with separate information about
      1. secured alternating power supply systems and
      2. secured direct power supply systems.
   d) cabling and cable routes,
   e) grounding and lightning protection systems, and
   f) other electrical systems.

9. Auxiliary systems and buildings, comprising descriptions and characteristics of
   a) nuclear fuel storage and handling systems,
   b) water supply and cooling systems, including
      1. systems for cooling selected equipment,
      2. the circulating cooling water system,
      3. the demineralised water replenishment system,
      4. the system of secured ultimate heat sink,
      5. potable and non-potable water supply systems and
      6. wastewater treatment and discharge systems.
   c) auxiliary operational systems, including
      1. compressed air systems,
      2. fluid sample collection systems,
      3. drainage systems for the treatment of active waters,
      4. the compressed nitrogen system and
      5. hydrogen storage and distribution system,
   d) air-conditioning, heating, cooling and ventilation systems, including the ventilation systems of
      1. control rooms and backup rooms,
      2. storage pools,
      3. auxiliary systems and active operations,
      4. the engine room,
      5. the rooms of safety systems and
      6. backup diesel generators,
   e) diagnostic systems for indication of failures and non-conformities,
   f) other auxiliary systems, including
      1. fire protection systems,
      2. communication systems,
      3. auxiliary systems of diesel generators and
      4. lifting equipment, cranes and the refuelling machine,

g) buildings and structures, including
   1. foundation structures,
   2. structures and buildings of the nuclear part of the nuclear installation and
   3. other building structures.

10. Steam and energy conversion systems, comprising descriptions and characteristics of
   a) the overall concept of the system,
   b) main steam pipelines of the system,
   c) feedwater and steam generator discharge systems,
   d) the turbine generator, condenser and turbine auxiliary systems, and
   e) measures against rupture of the main steam pipelines and feedwater piping.

11. Management of radioactive waste, comprising descriptions and characteristics of
   a) the sources of radioactive waste,
   b) systems for the management of liquid, gaseous and solid radioactive waste, and
   c) systems for the monitoring of the functions of radioactive waste management systems.

12. The method of radiation protection assurance, comprising descriptions and characteristics of
   a) the operational programme for radiation protection and implementation of the principles of radiation protection optimisation,
   b) record-keeping of the sources of ionising radiation,
   c) the design solution for radiation protection and
   d) how exposure of individuals is assessed and the principles of radiation protection assurance applied.

13. Operational aspects, comprising descriptions of
   a) the organisational structure of the operator of the nuclear installation,
   b) the method of personnel training,
   c) the implementation of operational programmes relating to
      1. maintenance, oversight, checks and tests,
      2. core design and nuclear fuel handling management,
      3. lifetime and ageing management,
      4. nuclear installation modification management,
      5. the feedback system,
      6. documentation and records, and
      7. management of stoppages,
   d) the system of internal regulations relating to
      1. administrative measures,
      2. normal operation and
      3. management of abnormal operation, accident conditions and other incidents,
   e) methods and results of assessment of nuclear installation operational safety indicators,
   f) the system of independent assessment of the method of operational management and
   g) measures to ensure physical protection of the nuclear installation.

14. The system of preparation and implementation of control and test programmes during construction, commissioning and operation of the nuclear installation, comprising
   a) a description of the concept and scope of the test programmes,
   b) specific information to be included in the operational safety report before the commencement of construction of the nuclear installation,
   c) information about test programmes implemented during the first physical start-up of the nuclear installation and the first power-generation start-up of the nuclear

installation, after stoppages due to nuclear fuel replacement and after implementation of modifications to nuclear installation design, and

d) information about special programmes to test selected equipment.

15. Safety analyses of design basis events, comprising

a) introductory general information about
   1. the input data set for the safety analyses,
   2. data related to these analyses and provided in other parts of the operational safety report,
   3. the selection of postulated initiating events for analyses of design basis events,
   4. the categorisation of design basis events and their classification into groups,
   5. computer programs, models and procedures used for the analyses,
   6. the setup of safety systems and protections,
   7. acceptance criteria for each group of the analyses and
   8. the method of presentation of the results of analyses in this part of the operational safety reports and

b) the results of analyses of design basis events
   1. leading to increased removal of heat from the nuclear reactor by the secondary circuit,
   2. leading to reduced removal of heat from the nuclear reactor by the secondary circuit,
   3. leading to reduced coolant flow in the primary circuit,
   4. caused by reactivity and power distribution anomalies in the core,
   5. caused by increased coolant amount in the primary circuit,
   6. caused by reduced coolant amount in the primary circuit,
   7. causing a radioactive release from subsystems or components of the nuclear installation and
   8. in the nuclear installation with the nuclear reactor shut down and in storage pools for irradiated nuclear fuel.

16. Limits and conditions, comprising information about

a) the objectives, sources and application of limits and conditions,
b) safety limits for the operation of the nuclear installation,
c) limit settings of protection systems,
d) limit conditions of operation,
e) requirements for carrying out operational controls,
f) administrative measures to ensure the safe operation of the nuclear installation and
g) supporting documentation used to justify the limits and conditions.

17. The management system, comprising a description of

a) the concept and roles of the management system in each phase of the nuclear installation's life cycle,
b) specific aspects of the management system,
c) safety culture assessment,
d) management system efficiency assessment and
e) assessment of the system of quality management of systems, structures and components relevant to nuclear safety.

18. Engineering psychology and ergonomics, comprising

a) a description of the programme to monitor and manage the human factor impact on processes relevant to nuclear safety, optimisation of the human-machine relationship,
b) analysis of whether the scope of participation of nuclear installation operators in the implementation of safety functions has been appropriately chosen,

c) information about the recruiting system and application of a personnel qualification system,
d) analysis of whether the proportion of human activities has been appropriately taken into consideration in the development of internal regulations,
e) demonstration of correct application of the principles and criteria of the human factor discipline in the design of the man-machine interface, in particular in the design of the reactor control room, the backup control room and the technical support centre of the nuclear installation,
f) information about verification and validation of the results of the human factor impact assessment programme and
g) information about the method and results of human performance monitoring.

19. Probabilistic safety assessment, containing
a) a description and justification of the purpose and scope of the presented probabilistic safety assessment of the nuclear installation with regard to the risk of exposure of the population,
b) information on how the results of the probabilistic safety assessment were used,
c) quality assessment and uncertainties of the probabilistic safety assessment conducted,
d) a description and evaluation of the results of the probabilistic safety assessment and
e) identification of design and operational measures significantly contributing to nuclear safety assurance.

20. Radiological emergency management, comprising
a) where an emergency planning zone has been established, a description of construction and related technical equipment needed to ensure full readiness for radiological accident response at the nuclear installation, in particular
    1. shelters
    2. the emergency control centre,
    3. the backup emergency control centre,
    4. the technical support centre,
    5. the backup technical support centre and
    6. the external emergency support centre, and
b) where no emergency planning zone has been established, a description of technical means specified in accordance with the implementing decree concerning the details of ensuring radiological emergency management to ensure
    1. the declaration of a radiological emergency and notification that it has occurred,
    2. management of and response to radiological emergencies,
    3. a communication link between the persons managing the radiological emergency response and assembly points, and
    4. a communication link as part of the system for the organisation of assembly or sheltering of persons and their departure or evacuation from assembly points or shelters.

21. Decommissioning of the nuclear installation, comprising
a) a description of the approach to the implementation of the statutory requirements for decommissioning the nuclear installation,
b) identification and justification of the chosen approach to decommissioning the nuclear installation,
c) a description of the concept for decommissioning the nuclear installation,
d) a decommissioning plan for the nuclear installation containing a programme to ensure the technical means necessary for implementing the plan,

e) specification of nuclear safety assurance measures in the course of decommissioning and
f) the currently anticipated timetable of decommissioning of the nuclear installation.

22. Management of events and scenarios of design extended conditions that do not develop into severe accidents, comprising
    a) a description of the objectives of the assessment the nuclear installation's capacity to cope with design extended conditions,
    b) references to the parts of the operational safety report that contain information necessary to assess the nuclear installation's resilience under design extended conditions,
    c) a description of the types of events and scenarios considered and categorisation of these scenarios, and
    d) descriptions of the methods of selection, resolution and results of the analyses of these scenarios, which shall contain
        1. justification of the selection of initiating events and scenarios,
        2. justification of the selection of acceptance criteria for the results of the analyses,
        3. basic assumptions of the analyses, initial conditions and information about the computing means used and
        4. a summary and evaluation of the results of the analysis.

23. Measures to prevent the occurrence and limit the consequences of severe accidents and analyses of postulated severe accidents, comprising
    a) a description of the safety objectives of analyses of severe accidents,
    b) an analysis of the methods to prevent the occurrence and development of severe accidents with references to the analyses referred to in points 19 and 22,
    c) identification of the available means to limit the consequences of severe accidents,
    d) a description and justification of the selection of the analysed variants of severe accidents, a summary of the results of analyses thereof and a discussion of the procedures that can be applied to limit their consequences,
    e) a description of severe accident management,
    f) a discussion of the results of the deterministic analysis of resilience of the nuclear reactor's pressure vessel and containment system in the event of a severe accident and
    g) a discussion of the efficiency of design measures and reasonably practicable modifications to the nuclear installation design to make the occurrence of a severe accident a practically excluded event or limit the consequences thereof.

24. Diversion and alternative means for the management of design extended conditions, comprising
    a) a list, technical specifications and evidence of efficiency of these means or specification where in the operational safety report this data is provided,
    b) a breakdown of these means into mobile and fixed,
    c) requirements for the environmental classification of the systems, structures and components of these means, and
    d) evidence of accessibility, reliability and usability of these means as required for interventions by nuclear installation operators.