

## GUIDE YVL A.5

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# CONSTRUCTION AND COMMISSIONING OF A NUCLEAR FACILITY

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1	Introduction	4
2	Scope of application	8
3	Procedures during nuclear facility construction	9
3.1	Project management	9
3.1.1	Risk management during construction and plant modifications of nuclear facilities	10
3.1.2	Project organisation and resources	10
3.1.3	Responsible manager for construction	11
3.2	Safety culture in construction operations	12
3.3	Licensing plan	12
3.4	Management of suppliers and the supply chain	14
3.5	Starting component and structure manufacturing and preparing the site before the granting of a construction licence	14
3.6	Non-conformance management in construction	15
3.7	Lessons learned from construction	16
3.8	Reporting and communication	17
3.8.1	General requirements for reporting and communication	17
3.8.2	Reporting to the Radiation and Nuclear Safety Authority	18
4	Special requirements for the commissioning of a nuclear facility	20
4.1	General requirements	20
4.2	Commissioning plan	21
4.3	Requirements concerning testing and testing programmes	22
4.4	System performance tests	24
4.5	Loading of nuclear fuel and testing after loading	25
4.6	Reporting on commissioning	27
5	Regulatory oversight by the Radiation and Nuclear Safety Authority	29
5.1	Oversight of design	29
5.2	Oversight of manufacturing, construction and installation	30
5.3	Oversight of commissioning	31
5.4	Oversight of reporting during construction	31
6	Appendix A Special requirements for the monthly report on nuclear facility construction	33

7 References ..... 35

Definitions

## Authorisation

According to Section 7 r of the Nuclear Energy Act (990/1987), the Radiation and Nuclear Safety Authority (STUK) shall specify detailed safety requirements for the implementation of the safety level in accordance with the Nuclear Energy Act.

## Rules for application

The publication of a YVL Guide shall not, as such, alter any previous decisions made by STUK. After having heard the parties concerned STUK will issue a separate decision as to how a new or revised YVL Guide is to be applied to operating nuclear facilities or those under construction, and to licensees' operational activities. The Guide shall apply as it stands to new nuclear facilities.

When considering how the new safety requirements presented in the YVL Guides shall be applied to the operating nuclear facilities, or to those under construction, STUK will take due account of the principles laid down in Section 7 a of the Nuclear Energy Act (990/1987): The safety of nuclear energy use shall be maintained at as high a level as practically possible. For the further development of safety, measures shall be implemented that can be considered justified considering operating experience, safety research and advances in science and technology.

According to Section 7 r(3) of the Nuclear Energy Act, the safety requirements of the Radiation and Nuclear Safety Authority (STUK) are binding on the licensee, while preserving the licensee's right to propose an alternative procedure or solution to that provided for in the regulations. If the licensee can convincingly demonstrate that the proposed procedure or solution will implement safety standards in accordance with this Act, the Radiation and Nuclear Safety Authority (STUK) may approve a procedure or solution by which the safety level set forth is achieved.

With regard to new nuclear facilities, this Guide shall apply as of 1 April 2019 until further notice. With regard to operating nuclear facilities and those under construction, this Guide shall be enforced through a separate decision to be taken by STUK. This Guide replaces Guide YVL A.5 (02.06.2014).

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## 1 Introduction

101. Under Section 7 f of the Nuclear Energy Act (990/1987), *safety shall take priority during the construction and operation of a nuclear facility; the holder of a construction licence shall be responsible for the nuclear facility's construction in accordance with safety requirements.*

[2013-11-15 ]

102. Detailed safety requirements for the construction and operation of nuclear power plants are given in the Radiation and Nuclear Safety Authority Regulation on the Safety of a Nuclear Power Plant (STUK Y/1/2018). Section 3 of the Regulation states that *the safety of a nuclear facility shall be assessed when applying for a construction license and operating license, in connection with plant modifications, and at Periodic Safety Reviews during the operation of the plant. It shall be demonstrated in connection with the safety assessment that the nuclear facility has been designed and implemented in a manner that meets the safety requirements.*

[2019-03-15 ]

103. Of essential importance in construction projects for nuclear facilities is that the safety requirements presented in legislation and the YVL Guides are understood and taken into account during all phases of the construction project and that the different parties commit themselves to fulfilling them. The construction of a new nuclear facility requires of all the organisations involved significant project management skills and technical competence so that safety-related objectives can be implemented. [2013-11-15 ]

104. Under Section 18 of the Radiation and Nuclear Safety Authority Regulation on the Safety of a Nuclear Power Plant (STUK Y/1/2018), *the holder of the nuclear facility's construction license shall ensure during construction that the nuclear facility is constructed and implemented in conformity with the safety requirements and using approved plans and procedures.*

[2019-03-15 ]

105. Respectively, Section 22 of the Radiation and Nuclear Safety Authority Regulation on the Safety of Disposal of Nuclear Waste (STUK Y/4/2018) states that *the holder of the nuclear facility's construction license shall ensure during construction that the facility is constructed and implemented in conformity with the safety requirements and using approved plans and procedures.* [2019-03-15 ]

106. Nuclear safeguards obligations shall also be taken into account in a construction project of a nuclear facility. Under Section 118 b of the Nuclear Energy Decree (161/1988), *the use of nuclear energy shall be planned and implemented so that the obligations concerning the*

*nuclear safeguards, as provided and defined in the Nuclear Energy Act and provisions issued thereunder, and in the Euratom Treaty and provisions issued thereunder, are met. The nuclear facility or any other place where nuclear energy is used shall not contain premises, materials or functions, relevant to the nuclear safeguards, which are not included in the design information. The licensee or any other user of nuclear energy shall have an accounting and reporting system for nuclear material and other nuclear use items which ensures the correctness, scope and consistency of information in order to implement the supervision necessary for the non-proliferation of nuclear weapons. [2013-11-15 ]*

107. Under Section 25 of the Radiation and Nuclear Safety Authority Regulation on the Safety of a Nuclear Power Plant (STUK Y/1/2018), *when designing, constructing, operating and decommissioning a nuclear facility, a good safety culture shall be maintained. Safety shall take priority in all operations. The decisions and activities of the management of each organisation participating in the abovementioned activities shall reflect its commitment to operational practices and solutions that promote safety. Personnel shall be encouraged to perform responsible work, and to identify, report, and eliminate factors endangering safety. Personnel shall be given the opportunity to contribute to the continuous improvement of safety.* A similar requirement is also presented in Section 38 of the Radiation and Nuclear Safety Authority Regulation on the Safety of Disposal of Nuclear Waste (STUK Y/4/2018). [2019-03-15 ]

108. The Radiation and Nuclear Safety Authority oversees the construction of nuclear facilities. Under Section 108 of the Nuclear Energy Decree (161/1988), *the various phases in the construction of a nuclear facility cannot be commenced until the Radiation and Nuclear Safety Authority (STUK) has, on the basis of the documents mentioned in Section 35 and other detailed plans and documents, ascertained for each phase that all safety-related factors and safety regulations have been given sufficient consideration. Under Section 109, after the construction licence has been granted, the Radiation and Nuclear Safety Authority (STUK) controls the implementation of the facility project in detail. The purpose of the control is to ensure that the conditions of the construction licence and the approved plans referred to in Section 35 are complied with and that the nuclear facility is also in other respects constructed in accordance with regulations issued on the basis of the Nuclear Energy Act. [2019-03-15 ]*

109. Under Section 55(4) of the Nuclear Energy Act (990/1987), the Radiation and Nuclear Safety Authority (STUK) may, upon request by anyone planning to use nuclear energy, check the plan drawn up by them and issue preliminary instructions on what should be taken into account with respect to safety, physical protection and emergency planning. Section 55(5) of the Nuclear Energy Act (990/1987) specifies the aforementioned as follows: *After Parliament*

*has decided that a decision-in-principle pertaining to a nuclear facility having significant importance remains in force, the Radiation and Nuclear Safety Authority can on request by the holder of the decision-in-principle inspect the nuclear facility and its systems, inspect and approve plans for components and structures and also inspect and witness the manufacturing of individual components and structures. No work related to structures affecting nuclear safety may, however, be commenced at the plant site before the construction licence has been granted. The structures and components inspected and approved by the Radiation and Nuclear Safety Authority may only be used for the construction of a nuclear facility if they are in conformance with the construction licence. [2019-03-15 ]*

110. The Radiation and Nuclear Safety Authority oversees modifications made at nuclear facilities. Under Section 112 of the Nuclear Energy Decree (161/1988), *if the licensee intends to carry out modifications to the nuclear facility systems, structures, nuclear fuel or the way the facility is operated that influence safety and involve changes in the plans or documents approved by the Radiation and Nuclear Safety Authority (STUK), the licensee shall obtain approval from STUK for such modifications before they are carried out. In addition, the licensee shall ensure that the documents submitted to the Radiation and Nuclear Safety Authority (STUK) as provided in Sections 35, 36 and 36 a are revised accordingly. [2019-03-15 ]*

111. Pertaining to commissioning, Section 19 of the Radiation and Nuclear Safety Authority Regulation on the Safety of a Nuclear Power Plant (STUK Y/1/2018) states that *in connection with the commissioning of a nuclear facility or its modifications, the licensee shall ensure that the systems, structures and components and the nuclear facility as a whole operate as designed. The procedures of the commissioning of the nuclear facility or its modifications shall be planned, and instructions shall be provided. At the commissioning stage, the licensee shall ensure that appropriate procedures are in place for the future operation of the nuclear facility. [2019-03-15 ]*

112. Respectively, Section 23 of the Radiation and Nuclear Safety Authority Regulation on the Safety of Disposal of Nuclear Waste (STUK Y/4/2018) states that *in connection with the commissioning of the nuclear facility or its modifications, the licensee shall ensure that the systems, structures and components and the facility as a whole operate as designed and that the disposal system can be implemented. The procedures of the commissioning of the nuclear facility or its modifications shall be planned, and instructions shall be provided. At the commissioning stage, the licensee shall ensure that appropriate procedures are in place for the future operation of the nuclear facility. [2019-03-15 ]*

113. The Radiation and Nuclear Safety Authority oversees the commissioning of nuclear facilities. Under Section 110 of the Nuclear Energy Decree (161/1988), *the various phases in the commissioning of a nuclear facility cannot be commenced until the Radiation and Nuclear Safety Authority (STUK) has determined, on the basis of the documents mentioned in Section 36, and other detailed plans and documents required by STUK, for each stage, that sufficient attention has been paid to factors influencing safety, and regulations concerning safety. Similar requirements also apply to the restarting of a nuclear facility after a particularly substantial plant modification.* [2013-11-15 ]

## 2 Scope of application

201. This Guide covers the construction of nuclear facilities and the requirements set for the various construction phases in order to ensure nuclear and radiation safety. The present Guide applies as it is to the construction of new nuclear facilities and to plant modifications to operating nuclear facilities, where applicable. Chapter 4 shall also apply to modifications, where applicable. [2019-03-15 ]

202. The Guide's requirements apply as they are to holders of construction and operating licences and to the appropriate extent to construction licence applicants planning to construct a nuclear facility as well as safety-significant suppliers contributing to construction or plant modification projects of nuclear facilities. [2013-11-15 ]

203. This Guide supplements, from the point of view of nuclear facility construction, the management system and reporting related requirements of Guide YVL A.1 "Regulatory oversight of safety in the use of nuclear energy" and Guide YVL A.3 "Leadership and management for safety", the requirements for nuclear facility organisation and personnel in Guide YVL A.4 "Organisation and personnel of a nuclear facility" and the operating experience feedback related requirements of Guide YVL A.10 "Operating experience feedback of a nuclear facility". [2019-03-15 ]

204. Guide YVL B.1 "Safety design of a nuclear power plant" presents the plant and system design licensing requirements. Requirements for the safety classification of systems, structures and components are given in Guide YVL B.2 "Classification of systems, structures and components of a nuclear facility". Nuclear safeguards related requirements are presented in Guide YVL D.1 "Regulatory control of nuclear safeguards", nuclear fuel handling and storage are addressed in Guide YVL D.3 "Handling and storage of nuclear fuel", and final disposal of nuclear waste in Guide YVL D.5 "Disposal of nuclear waste" and Guide YVL D.7 "Release barriers of spent nuclear fuel disposal facility". [2019-03-15 ]

205. This Guide sets forth commissioning requirements for the nuclear facility and its systems. The utilisation of probabilistic risk assessment methods in the preparing of testing programmes is addressed in Guide YVL A.7 "Probabilistic risk assessment and risk management of a nuclear power plant". The contents of reports to be prepared on the behaviour of the reactor and fuel are described in Guide YVL A.6 "Conduct of operations at a nuclear power plant". More detailed commissioning requirements of systems, structures and components are given in Guides YVL B.8 "Fire protection at a nuclear facility", YVL C.6 "Radiation monitoring of a nuclear facility" as well as in the D and E Series of the YVL Guides. [2019-03-15 ]



## 3 Procedures during nuclear facility construction

### 3.1 Project management

301. General requirements relating to project management are given in Guide YVL A.3.  
[2014-06-02 ]

302. Processes and procedures required to manage, control and implement a construction project of a nuclear facility shall be defined, described and carried out. [2013-11-15 ]

303. Project management procedures shall be in place to ensure that matters significant for nuclear and radiation safety are dealt with at organisational levels determined in advance and based on a matter's safety significance also by the management of the licensee's project organisation. [2013-11-15 ]

304. The licensee's management shall at pre-determined intervals review processes and procedures planned and implemented for a construction or plant modification project of a nuclear facility to ensure that they are still suitable, appropriate and effective. [2013-11-15 ]

305. The phases of the nuclear facility's construction project shall be determined and the plans pertaining to them documented and maintained for the project's entire life cycle. [2013-11-15 ]

306. When determining the construction project's phases, also the preparation of the licensee's organisation for operating the nuclear facility shall be taken into consideration. [2013-11-15 ]

307. The arrangement of nuclear safeguards in accordance with Guide YVL D.1 shall be taken into account in construction. [2013-11-15 ]

308. Licensing and other regulatory approvals necessary as well as the related procedures shall be coupled with the phases and processes of the nuclear facility's construction project.  
[2013-11-15 ]

309. The licensee shall ensure that safety-significant suppliers contributing to construction and plant modification projects have adequate competence and systematic procedures as regards their own deliveries and that the suppliers have the necessary operational prerequisites and that they follow the set safety requirements. [2019-03-15 ]

310. Removed. [2019-03-15 ]

311. Moved to Guide YVL A.3. [2019-03-15 ]

### **3.1.1 Risk management during construction and plant modifications of nuclear facilities**

312. The licensee and safety-significant suppliers shall have in place systematic procedures for identifying, analysing and controlling risks relating to the safe implementation of construction or plant modification projects of nuclear facilities as well as procedures for making decisions about preventive actions and monitoring their implementation. [2013-11-15 ]

313. Risk management procedures shall cover risks relating to nuclear and radiation safety, quality and inter-organisational co-operation as well as construction-related risks significant for the nuclear and radiation safety of other nuclear facilities on the same site. Risk assessments shall also take into account risks arising from nuclear facilities operating on the site.

[2013-11-15 ]

314. Risk management processes and procedures shall be described in a risk management plan to be submitted to STUK for information with the submission of the construction licence application or the conceptual design plan for a modification project and always after updating the risk management plan. [2013-11-15 ]

315. The risks identified, risk categorisation, the risk management plan, measures to mitigate the consequences, and procedures to monitor the measures shall be entered in a risk register that shall be maintained for the project's entire life cycle. [2013-11-15 ]

316. STUK shall be provided with the possibility to review nuclear and safety significant entries of the risk register. [2013-11-15 ]

317. The project management, those in charge of different operations and other essential personnel shall be made familiar with the identification and management of risks relating to nuclear and radiation safety, quality and the operation of organisations. [2013-11-15 ]

318. The personnel shall be encouraged to foresee and identify risks as well as inform foremen and management about such observations. [2013-11-15 ]

### **3.1.2 Project organisation and resources**

319. The requirements for organisation and resources presented in Guides YVL A.3 and YVL A.4 shall apply in the construction project for a nuclear facility. [2019-03-15 ]

320. Since activities relating to the nuclear facility's construction, commissioning and operation by several different organisations partly take place at the same time, the responsibilities of the organisations shall be specified and detailed so that no unsolved or undefined matters remain as regards the functions of the different organisations. [2013-11-15 ]

320a. The transfer of responsibilities between groups and organisations shall be planned and controlled. [2019-03-15 ]

321. Removed. [2019-03-15 ]

322. The management of the licensee and that of the organisations of suppliers essential for the project as well as tasks essential for nuclear and radiation safety and quality shall employ persons with competence and experience in the nuclear field and of demanding construction or plant modification projects. [2013-11-15 ]

323. The licensee shall have in place procedures to identify and manage their own resource needs during construction or plant modification projects. [2013-11-15 ]

324. Removed. [2019-03-15 ]

325. The licensee shall have in place procedures to regularly assess the functionality of inter-organisational interfaces between own organisation and the supplier as well as in supplier organisations. [2019-03-15 ]

326. The licensee shall have in place procedures to verify the competence of those in the organisations and their management as well as those carrying out duties important for nuclear and radiation safety and quality. [2013-11-15 ]

327. Licensee procedures and resource plans shall cover the commissioning of the facility under construction. [2013-11-15 ]

328. The licensee organisation shall have adequate human resources and competence for the facility's commissioning and operation in good time before the start of commissioning so that the persons can familiarise themselves with and become experienced in the nuclear facility's operation during the project. [2013-11-15 ]

### **3.1.3 Responsible manager for construction**

329. Under Section 7 k of the Nuclear Energy Act (990/1987), the licensee shall appoint a responsible manager and his or her deputy for the construction of the nuclear facility. The qualification and suitability requirements for the responsible manager are given in Section 125 of the Nuclear Energy Decree (161/1988). Appendix A to Guide YVL A.4 sets forth more detailed requirements for the responsible manager in charge during the construction of the nuclear facility and his or her deputy as well as their approval. The responsible manager and his or her deputy shall be appointed before the construction licence is granted. [2019-03-15 ]

330. The responsible manager for construction shall be part of the licensee's project management. The responsible manager's deputy shall have sufficient authority to carry out duties required in the position. [2013-11-15 ]

331. It is the task of the responsible manager for the construction of the nuclear facility to ensure that regulations pertaining to nuclear facility safety, security, emergency arrangements and nuclear safeguards, YVL guides as well as the conditions stated in the decision-in-principle, construction licence and operating licence as well as STUK's decisions are known and complied with in all phases of the construction project and also in safety-significant organisations involved in the project. [2013-11-15 ]

332. The operation of the nuclear facility's construction project organisation and the flow of information shall be arranged in a way to keep the responsible manager and his or her deputy informed about the project status and all factors essentially affecting facility safety and about their processing as required by their safety importance. [2013-11-15 ]

### **3.2 Safety culture in construction operations**

333. Removed. [2019-03-15 ]

334. Organisations contributing to the construction or plant modification project of a nuclear facility shall have a good safety culture in place. The requirements for safety culture, its evaluation and development are given in Guide YVL A.3. [2019-03-15 ]

335. Removed. [2019-03-15 ]

336. Moved to Guide YVL A.3. [2019-03-15 ]

337. Moved to Guide YVL A.3. [2019-03-15 ]

### **3.3 Licensing plan**

338. The licensee shall draw up a licensing plan for the construction of a new nuclear facility or an extensive plant modification of an operating facility describing how the fulfilment of nuclear and radiation safety requirements is ensured and demonstrated in the different phases of the construction or plant modification project. [2013-11-15 ]

339. In connection with the construction licence application for a new nuclear facility, a licensing plan shall be submitted to STUK for information including at least:

- the project main phases with their planned schedule (i.e. design and manufacturing schedule for the main components; duration of the design, construction, installation and

commissioning phases; configuration freeze points in relation to the phases of regulatory review; submission of the operating licence application; and starting the operation of the facility)

- the titles and descriptions of the main contents of the document types specified in the YVL Guides which are to be submitted to STUK during the construction, principles for the document submission schedule and the time available for STUK's review
- a plan for the licensing of safety-related matters at system level in the construction licence phase in accordance with the requirements stated in Chapter 6 of Guide YVL B.1
- a plan for addressing safety-related matters at component level in different documents, as specified in the YVL Guides, and their scheduling in relation to component design, manufacturing and construction, including advance approvals as referred to in section 3.5, which comply with Section 55 of the Nuclear Energy Act (990/1987).

[2019-03-15 ]

340. A licensing plan shall be submitted to STUK for information in view of a plant modification of an operating nuclear facility with the submission of the first conceptual design plan. The licensing plan shall present at least

- the main phases of the plant modification with their schedules (design, manufacturing, construction, installation, commissioning)
- a list of the systems to be modified and their safety classification
- pre-inspection documentation of the systems and commissioning-related plans to be submitted to STUK for approval or information, their planned submission schedule and the time available for STUK's review
- a plan on how safety-related matters are addressed at component level in different documents as specified in the YVL Guides and their scheduling in relation to component design, manufacturing and implementation of modifications
- an assessment of the need to update the documents that comply with Section 36 of the Nuclear Energy Decree (161/1988) and facility procedures.

[2019-03-15 ]

341. If the principles presented in the licensing plan submitted to STUK essentially change during the construction of a new nuclear facility or the modification of an operating nuclear facility, the updated licensing plan shall be submitted to STUK for information. Such changes include changes in titles and contents of documents to be submitted to STUK that are matters

of principle and schedule postponements, which essentially affect the progress of the project.  
[2013-11-15 ]

### **3.4 Management of suppliers and the supply chain**

342. General requirements for the management and control of suppliers and supply chains as well as purchases are given in Guide YVL A.3. [2019-03-15 ]

343. Removed. [2019-03-15 ]

344. Removed. [2019-03-15 ]

345. Removed. [2019-03-15 ]

346. Removed. [2019-03-15 ]

347. Removed. [2019-03-15 ]

348. Removed. [2019-03-15 ]

349. Moved to Guide YVL A.3. [2019-03-15 ]

350. Moved to Guide YVL A.3. [2019-03-15 ]

351. Moved to Guide YVL A.3. [2019-03-15 ]

352. Removed. [2019-03-15 ]

353. Removed. [2019-03-15 ]

### **3.5 Starting component and structure manufacturing and preparing the site before the granting of a construction licence**

354. Under Section 55 of the Nuclear Energy Act (990/1987), the Radiation and Nuclear Safety Authority can, upon request by the holder of a decision-in-principle, inspect the nuclear facility and its systems; review and approve component and structure related plans as well as inspect and witness the manufacturing of individual components and structures in so far as it is appropriate for starting the manufacture of the facility's most important components and structures having a long manufacturing time. The appropriateness of the aforementioned principle's application shall be justified when submitting applications for STUK's approval.  
[2013-11-15 ]

355. Under Section 55 of the Nuclear Energy Act (990/1987), structures and components proactively inspected and approved by STUK may be used in the construction of a nuclear facility only if they comply with the construction licence. [2019-03-15 ]

356. The licensee shall ensure that the requirements of the YVL Guides are complied with in component design and manufacturing as well as in the control of manufacturing and supply chain started before the granting of the construction licence. [2013-11-15 ]

357. Before the start of manufacturing, the Radiation and Nuclear Safety Authority's approval shall be obtained for matters and documents pertaining to the design and manufacturing of safety-classified components or structures presented in the YVL Guides. The licensee shall in the same connection present the documents that have been used in determining the design bases of the components and structures. Such documents may include preliminary safety and design analyses. [2013-11-15 ]

358. Under Section 55 of the Nuclear Energy Act (990/1987), plans regarding civil construction at the site may be submitted to the Radiation and Nuclear Safety Authority for review in advance. [2019-03-15 ]

359. Under Section 55 of the Nuclear Energy Act (990/1987), work on structures impacting nuclear safety must not be started at the site before the construction licence is granted. [2019-03-15 ]

360. Preparatory earthmoving and excavation work may be carried out at the site before the construction licence is granted provided that the necessary permits have been obtained. Commencing concrete casting of safety-classified structures or of the construction of underground facilities affecting the long-term safety of final disposal require a construction licence in accordance with the Nuclear Energy Act (990/1987). [2019-03-15 ]

361. The licensee shall ensure before starting the preparatory work that the safety classification of the structures comply with the requirements of Guide YVL B.2. [2019-03-15 ]

362. The risks of preparatory work shall be assessed and entered in the risk register as required in section 3.1.1. [2014-06-02 ]

### **3.6 Non-conformance management in construction**

363. General requirements relating to non-conformance management are given in section 7.5 of Guide YVL A.3. [2014-06-02 ]

364. The licensee shall ensure documented procedures for the management of non-conformances during the construction project of a nuclear facility. They shall include procedures for the identification and classification of non-conformances as well as for temporary or permanent approval. [2013-11-15 ]

365. The procedures for the management of non-conformances shall cover non-conformances relating to products and the operation of organisations. [2013-11-15 ]

366. The procedures for the management of non-conformances shall prevent the use of defective parts or materials as well as inadequate functions or services. [2013-11-15 ]

367. The licensee shall ensure that the organisations involved in the construction or plant modification project and who supply safety-significant products or services comply with the project's procedures for the management of non-conformances. [2019-03-15 ]

368. The licensee shall have efficient procedures in place for the processing and follow-up of non-conformances to ensure the timely and high-quality implementation of corrective and preventive action. [2013-11-15 ]

369. The direct causes of non-conformances, non-conformance scope and impact on other equivalent components and the root causes of safety significant or recurring non-conformances shall be determined. [2013-11-15 ]

370. Non-conformances shall be grouped. The number of non-conformances in the groups and their trend shall be followed. Based on the follow-up, necessary action shall be taken to analyse the non-conformances and to determine the root causes. [2013-11-15 ]

371. Reports on non-conformances significant for nuclear or radiation safety shall be submitted to STUK for approval. The licensee's management system shall define the principles of submitting non-conformance reports to STUK for review. [2013-11-15 ]

### **3.7 Lessons learned from construction**

372. In construction projects of nuclear facilities, experiences gained on the construction and operation of other equivalent safety-critical facilities, systems, structures or components and also best practices from other fields of industry shall be utilised, taking into account, however, the potential effects on radiation and nuclear safety of the procedures. [2019-03-15 ]

373. In reviewing, reporting and utilising the lessons learned during the nuclear facility's construction, the requirements of Guide YVL A.10 shall be applied. [2013-11-15 ]

374. During nuclear facility construction, the licensee shall have adequate resources, competence and methods to analyse the root causes of safety-significant non-conformances and events. [2013-11-15 ]

375. When the nuclear facility's commissioning starts the licensee shall have in place the operational experience feedback organisation defined in Guide YVL A.10 even if the events



under scrutiny would not as such have direct nuclear or radiation safety significance.

[2013-11-15 ]

376. The licensee shall assess the nuclear facility's construction and plant modification project during the project, after the completion of its various phases and after the project has finished. The information and experiences gathered in the review shall be utilised in project development and in improving the organisation's operation. [2013-11-15 ]

377. In the review of the nuclear facility's construction and plant modification projects at least the following shall be assessed: procedures used, adoption of new methods and solutions, learning and possible inadequacies in competence, management and utilisation of competence and know-how, as well as the effectiveness and suitability of follow-up methods. [2013-11-15 ]

### **3.8 Reporting and communication**

#### **3.8.1 General requirements for reporting and communication**

378. The licensee shall define procedures for reporting that assesses the progress of the nuclear facility's construction and plant modification projects. [2014-06-02 ]

379. The reporting shall be regular and, where necessary, available to the parties involved in the project. [2013-11-15 ]

380. The reporting objective is to ensure that all those involved in the project have available real-time and adequate data about the project timetables, progress, organisations operating at the site and their interfaces as well as safety-significant non-conformances and events in the project and also about the related corrective and preventive action. [2013-11-15 ]

381. Reporting shall be thorough and open. [2019-03-15 ]

382. Phase and final reports shall be prepared on the construction and plant modification project. The reports shall contain a summary of the results of the assessment required in para 376. [2013-11-15 ]

### 3.8.2 Reporting to the Radiation and Nuclear Safety Authority

383. Regular reporting on the project's status and the obligation to report to the Radiation and Nuclear Safety Authority potential events occurring during the construction begins when the manufacturing of the nuclear facility's components and structures commences. Commencement of the material manufacturing of the nuclear power plant's main components (e.g. primary circuit main components) and preparation work for starting civil construction work (such as excavation) at the site are considered as such commencement. However, regular reporting during construction shall begin when the Government has granted the nuclear facility a construction licence at the latest. [2013-11-15 ]

384. Notification and reporting related to the events during the nuclear facility's construction shall comply with the reporting requirements presented in Guide YVL A.10. [2013-11-15 ]

385. The reports to be submitted regularly during the construction of a nuclear facility include the monthly report on construction and the annual report on construction. Regular reporting during construction shall comply with the general reporting requirements presented in Guides YVL A.9 and YVL D.1. [2013-11-15 ]

386. It shall be possible, based on the monthly report, to get an overall picture of the project's progress and the licensee's performance. The report shall include at least the items presented in Appendix A. The report shall be submitted to STUK for information. [2013-11-15 ]

387. In order to fulfil the objectives presented in para 386, the licensee shall step up the reporting interval if the project's progress so requires. [2013-11-15 ]

388. The annual report on construction for the previous calendar year shall be submitted to STUK for information by 1 March of the following year. [2013-11-15 ]

389. In addition to a written description, the annual construction report shall present in graphic form all the data for which such a form of presentation is suitable. The report shall also state the causes of changed development trends in so far as possible. The data to be gathered for inclusion in STUK's databases shall be submitted to STUK in separately agreed electronic format where necessary. [2013-11-15 ]

390. The annual report on construction shall present an overall safety assessment for the reporting year. The assessment shall present the actions implemented or initiated to ensure and enhance safety in the reporting year (Section 20 of Radiation and Nuclear Safety Authority Regulation on the Safety of a Nuclear Power Plant STUK Y/1/2018). These include the results of safety-significant research and analysis and their effect on the facility's design and

construction; safety-significant design modifications; measures relating to service life management and operating experience feedback utilisation as well as quality management activities. [2019-03-15 ]

391. After the granting of the nuclear facility's operating licence, the requirements for regular reporting given in Guide YVL A.9 shall apply as they are, however, in such a way that the reports are complemented with data in accordance with Appendix A, where necessary. However, daily reporting as provided in Guide YVL A.9 shall be started from the first fuel loading and regular reporting, where applicable, according to the contents requirements of daily reporting starting from fuel delivery. [2019-03-15 ]

392. In reporting plant modification projects, attention shall be paid to the realisation of the objective of para 386. The items listed in Appendix A shall be presented for plant modification projects, when applicable, in connection with quarterly reports on the operation of the nuclear facility. [2013-11-15 ]

393. Reports on the different project phases and a final report on the construction and facility modification project shall be submitted to STUK for information. [2019-03-15 ]

## 4 Special requirements for the commissioning of a nuclear facility

### 4.1 General requirements

401. It shall be verified during commissioning that the facility's systems, structures and components as well as the functions they accomplish fulfil the design requirements.

[2013-11-15 ]

402. It shall be ensured during commissioning that the structure, functions and duties of the licensee's organisation as well as the number and competence of the necessary personnel are adequate to ensure the safe operation of the nuclear facility. [2013-11-15 ]

403. It shall be ensured during commissioning that the instructions and procedures for the operation of the facility, systems, structures and components are adequate and appropriate.

[2013-11-15 ]

404. The facility's operating and testing procedures shall be used during commissioning tests when possible to validate them. [2013-11-15 ]

405. It shall be verified during commissioning tests that the planned periodic testing of the facility, systems and components can be performed. [2013-11-15 ]

406. During the commissioning tests, basic data on the operational properties of structures, systems and equipment shall be gathered for use as a basis for assessing the results of periodic testing during operation and for the assessment of changes in the operability of components. [2019-03-15 ]

407. The licensee's personnel shall participate in the commissioning testing to familiarise themselves with the facility and its systems. [2019-03-15 ]

408. Instructions shall be in place for procedures applied during commissioning. The commissioning procedures shall be submitted to the Radiation and Nuclear Safety Authority for information. [2013-11-15 ]

## 4.2 Commissioning plan

409. A commissioning plan shall be drawn up for commissioning. The plan shall be submitted to the Radiation and Nuclear Safety Authority for approval as part of the construction licence application documentation. The plan may be incorporated in the Preliminary Safety Analysis Report (PSAR) or it can be submitted as a separate document in connection with the PSAR. The plan shall include the following information at the minimum

- organisations involved in the commissioning, including their areas of responsibility
- structure of commissioning-related documentation
- procedures and guidelines for the planning of commissioning tests
- utilisation of experiences gained from other facilities of the same type in the planning of commissioning tests
- licensee actions to ensure that their own organisation is capable of handling tasks important to nuclear safety
- phasing of commissioning testing as well as contents and objectives of each phase
- role of testing in the training of the facility's future personnel
- a schedule for drawing up the plant's operating instructions and a plan specifying the role of testing in ensuring the correctness and adequacy of these instructions
- preliminary commissioning testing schedule.

[2019-03-15 ]

410. The commissioning plan shall be updated well in advance of the start of commissioning and shall be supplemented with the following information at the minimum:

- a list of test programmes to be drawn up for commissioning testing
- a report of the use of the PRA in the drawing up of the testing programmes to assess the scope and balance of the programmes and to reduce the risks of testing (Guide YVL A.7, para 325)
- mutual performance order of the test programmes
- conditions for phase-to-phase progress and other hold and witness points for testing
- a testing schedule specifying the planned duration of different tests
- identification of items requiring special attention and summaries of the tests planned for them
- procedures for review and reporting of test results and a description of the procedure in case some test results do not comply with the acceptance criteria

- a plan for maintenance during commissioning
- familiarisation of the personnel involved in commissioning with their tasks.

The updated commissioning plan shall be submitted to STUK for approval. [2014-06-02 ]

### **4.3 Requirements concerning testing and testing programmes**

411. Testing shall be divided into phases (e.g. system performance tests, pre-criticality tests, low power tests, power tests). [2013-11-15 ]

412. Prior to proceeding from one phase to another, the prerequisites for continued testing shall be assessed based on the results of the preceding phase. [2013-11-15 ]

413. The facility's safety must not rest on untested safety functions. If there are functions that can be tested only after the nuclear facility's operation begins, a safety assessment of the matter shall be drawn up. The safety assessment shall, at a minimum, describe why the function cannot be tested earlier, possible compensatory arrangements for performing the function or the possibility of ensuring the function's operability with tests conducted at earlier phases. The safety assessment shall be submitted to STUK for information before the nuclear facility's operation begins. [2013-11-15 ]

414. For the purpose of testing, testing programmes shall be drawn up for suitable entities. Each system and phase, for example, can have their own testing programme. A testing programme may comprise several individual tests. [2014-06-02 ]

415. Test procedures for individual tests shall be drawn up in advance. [2013-11-15 ]

416. The testing programme shall include the following information at the minimum

- preface
- objective of the test programme
- tests included in the test programme
- description and objectives of each test
- organisations involved in the performance of the testing programme and delineation of their responsibilities
- references to detailed test procedures of the tests
- acceptance criteria for each test.

[2014-06-02 ]

417. The planned reactor power levels shall be stated in the low power test and power test programmes. [2013-11-15 ]

418. At the minimum, the test procedures shall present for each test

- prerequisites for conducting the test
- restrictions on plant operation and other conditions for the performance of the test
- test conditions
- initial state of the systems
- instruments to be employed and other testing equipment and systems required; also in so far as not part of the facility's fixed equipment
- a description of what provisions are made for malfunctions during the test performance
- specific regulations concerning occupational safety and component shielding
- personnel necessary for the test and special expertise possibly required
- instructions for performing the test
- completion of the test
- recording of data to be monitored during the test
- the reporting method of the results.

[2019-03-15 ]

418a. A responsible person and his or her deputy shall be appointed for each test and the names and contact information of the responsible persons shall be made available to the persons participating in the tests. [2019-03-15 ]

419. Removed. [2019-03-15 ]

420. With regard to a new nuclear facility, testing programmes of systems of safety classes 1 and 2, testing programmes of systems used for severe accident management and testing programmes of plant tests (e.g. low-power tests and power tests) shall be submitted to STUK for approval. The testing procedures for the testing programmes shall be submitted for information. [2019-03-15 ]

420a. In terms of changes to systems of safety class 1 and 2 and those meant for severe accident management, which according to Guide YVL B.1 require the submission of a conceptual design plan or pre-inspection documentation to STUK for approval, a testing programme shall be submitted to STUK for approval and the related testing procedures for information. [2019-03-15 ]

421. With regard to a new nuclear facility, testing programmes of class EYT/STUK systems and systems of safety class 3 other than those meant for the management of severe accidents shall be submitted to STUK for information. The testing procedures related to the testing programmes shall be made available to STUK. [2019-03-15 ]

421a. In terms of changes to systems of class EYT/STUK and other systems than those meant for the management of severe accidents in safety class 3, which according to Guide YVL B.1 require the submission of a conceptual design plan or pre-inspection documentation to STUK for information, a testing programme shall be submitted to STUK for information. The testing procedures related to the testing programmes shall be made available to STUK. [2019-03-15 ]

422. Removed. [2019-03-15 ]

423. If a testing programme is subject to STUK's approval, the test may take place only after receipt of the approval. Commencement of the test means the first measure taken to demonstrate the performance of the tested item. However, inspections and tuning of the I&C equipment, flushing of piping and other preparatory measures can be carried out without STUK's approval for the testing programme. [2014-06-02 ]

424. Detailed requirements for component testing and testing programmes as well as inspections conducted by the Radiation and Nuclear Safety Authority or an authorised inspection body are given for fire protection systems in Guide YVL B.8, for radiation monitoring systems in Guide YVL C.6, for systems, structures and components relating to the handling of nuclear use items and waste in the D series of the YVL Guides and for nuclear facility structures and components in the E series of the YVL Guides. [2014-06-02 ]

#### **4.4 System performance tests**

425. Before the testing of systems, the readiness for testing of individual components and structures shall be verified in commissioning inspections in accordance with the YVL Guides. Commissioning inspection requirements for fire protection systems are given in Guide YVL B.8, for radiation measurement systems in Guide YVL C.6, for nuclear use item and waste treatment related systems, structures and components in the D Series of the YVL Guides and for nuclear facility structures and components in the E Series of the YVL Guides. [2013-11-15 ]

426. System performance tests shall demonstrate, as far as possible, that every system important to safety and every individual part thereof is capable of fulfilling its designed functions. [2019-03-15 ]



427. System performance tests shall demonstrate that the systems are capable of functioning together in compliance with the design requirements. [2013-11-15 ]

428. The tests shall ensure the intended operability under normal operating conditions and, as far as possible, under those transient and accident conditions in which the systems are required to function. [2019-03-15 ]

#### **4.5 Loading of nuclear fuel and testing after loading**

429. For nuclear fuel loading, a loading plan shall be drawn up containing the following information

- summary of the neutron flux and gamma radiation monitoring equipment and any other special measuring instruments required during loading
- the organisation responsible for loading, and the number, training and duties of personnel required during loading
- the status of the reactor containment building and the systems contained in it during loading
- detailed loading instructions
- special safety instructions to be observed and precautions to be taken during loading.
- the licensee's safety assessment on the fulfilment of the preconditions for starting the operation of the facility and the results of pre-operational testing completed prior to loading in the scope deemed necessary to justify the conclusions of the safety assessment.

[2019-03-15 ]

430. The loading plan shall be submitted to STUK for approval. [2013-11-15 ]

431. Loading of the reactor may begin after STUK has approved the loading licence application.

The prerequisites for granting the loading licence are

- the plant has been granted an operating licence
- STUK has carried out the inspection in accordance with Section 20 of the Nuclear Energy Act (990/1987), the more detailed contents of which is presented in Guide YVL A.1
- STUK has approved the loading plan
- STUK has approved the application for the operation permit of the nuclear fuel in accordance with Guide YVL E.2 "Procurement and operation of nuclear fuel and control rods".

[2019-03-15 ]

432. Before making the reactor critical, pre-criticality tests shall be conducted after fuel loading. The pre-criticality tests shall test such functions and properties, which cannot be tested before fuel loading but do not require reactor criticality. [2013-11-15 ]

433. The closing of the primary circuit and the pre-criticality tests of the reactor systems may begin after STUK has inspected the loading pattern of the fuel assemblies and approved the reports on the behaviour of the reactor and fuel during the first operation period prepared in accordance with para 608 of Guide YVL A.6 and the pre-criticality test programmes. [2013-11-15 ]

434. The procedure of making the reactor critical shall be described in a detailed programme, which, where applicable, fulfils the requirements set for testing programmes given in section 4.3 of this Guide. The programme shall be submitted to STUK for approval. [2014-06-02 ]

435. STUK's permission shall be applied for making the reactor critical and conducting low power tests. The results of pre-criticality tests shall be submitted as part of the application within the scope necessary to demonstrate fulfilment of the acceptance criteria. [2013-11-15 ]

436. Making the reactor critical may begin after STUK has approved the programme describing the measures to be taken and granted permission to make the reactor critical. [2013-11-15 ]

437. Low power tests may be started after STUK has approved the low power test plan and granted permission to commence the tests. [2013-11-15 ]

438. Low power tests shall verify that the reactor core behaves predictably and that the plant and its systems operate as planned also with the reactor in power operation. The power level to be used shall be the lowest possible during which the necessary parameters can be reliably measured. [2019-03-15 ]

439. STUK's approval shall be applied for the performance of power tests. The results of low power tests within the scope necessary to prove fulfilment of the acceptance criteria shall be attached to the permit application. [2013-11-15 ]

440. Power tests may be started after STUK has approved the test programme for the power tests and granted permission to start the tests at the power level presented in the programme. [2013-11-15 ]

441. Power tests shall verify the nuclear power plant's planned operation at various power levels. Within the realms of possibility, the plant's behaviour shall also be tested during operational occurrences. [2013-11-15 ]

442. STUK's approval shall be applied for the raising of power. Item 515a describes STUK's overseeing procedure related to the matter. To be attached to the application are the results of tests conducted at the previous power level in the scope necessary to demonstrate fulfilment of the acceptance criteria. [2019-03-15 ]

443. During power tests, power may be raised to the next level presented in the power test programme after STUK has granted its approval for the raising of power. [2013-11-15 ]

444. A testing programme for the determination of neutron and gamma radiation shall be in use to chart radiation levels in the vicinity of the reactor, primary circuit and other major radiation sources in particular. The programme shall be submitted to STUK for approval. [2014-06-02 ]

445. Radiation measurements shall be conducted extensively at different power levels to ensure correctness of area classification and markings. [2013-11-15 ]

#### **4.6 Reporting on commissioning**

446. A result report shall be drawn up on the conducting of every testing programme. If testing in accordance with a testing programme is divided into different phases, the result report shall be drawn up phase by phase. [2014-06-02 ]

447. In addition to final test results, the result report shall contain information on non-conformances in the testing programme (for example, in terms of the scope or acceptance criteria), their causes and with regard to the accepted non-conformances the justifications for their acceptance and also the repair and improvement measures taken during the testing that were necessary to achieve acceptable results. [2019-03-15 ]

448. A summary report shall be drawn up of each phase of the testing presenting, in addition to essential results of the phase in question, a summary of the observations made during the testing as well as an assessment of the appropriateness of the testing performed in the phase concerned and any necessary changes to the operation of the plant. The summary shall be appended to the result report of the phase concerned or, if the transfer to the following phase requires an approval from STUK, the summary shall be appended to the application regarding the transfer. [2019-03-15 ]

449. Before starting the operation and on completion of the testing, the licensee shall assess the testing results as a whole. To be assessed in this connection are, for instance, whether any modifications to the plant's Operational Limits and Conditions, procedures, operating organisation or training are necessary. [2019-03-15 ]

450. The result reports shall be submitted to STUK for information for all the tests, whose testing programme is required to be submitted to STUK. If the performance of the tests required deviated from the testing programme or if the test results did not comply with the acceptance criteria, the report shall be submitted for approval. The reports shall be submitted within two months of the completion of the tests, unless the YVL Guides lay down some other deadline requirement for the reports. [2019-03-15 ]

451. The final safety report shall present a summary of the commissioning. A summary of the testing results shall be appended to the final safety report when they become available.  
[2013-11-15 ]

## 5 Regulatory oversight by the Radiation and Nuclear Safety Authority

### 5.1 Oversight of design

501. The general principle is that STUK approves plant and system design for a new nuclear facility in connection with the review of the plant's construction and operating licence applications in accordance with Chapter 7 of Guide YVL B.1. In terms of plant modifications, the corresponding inspection points are the review of conceptual design plans of the modifications and the pre-inspection documents of systems. The licensee shall in connection with the licensing plan for a construction or plant modification project present in detail how the fulfilment of nuclear and radiation safety requirements is demonstrated during the various phases of a construction or plant modification project. The licensing plan shall be submitted to STUK for information as part of the construction licence application or in connection with the conceptual design plan for a plant modification. [2013-11-15 ]

502. In addition to reviewing the end results of design, STUK oversees the licensee's activities to assess, guide and approve the design performance impacting nuclear or radiation safety. Before the construction licence application is submitted, this involves an assessment by STUK of the safety-related sections of the invitation for tenders in accordance with Section 3.2 of Guide YVL A.1 and regular monitoring of the project's progress. After the construction licence application has been submitted, STUK assesses the functionality of the licensee's management system and the adequacy of the procedures as part of the inspections of the inspection programme relating to the review of the construction licence application (RKT). [2019-03-15 ]

503. After the construction licence has been granted, STUK assesses the functionality of the licensee's management system and the adequacy of the procedures to evaluate, guide and approve design operations as part of the inspections of the construction inspection programme (CIP). [2013-11-15 ]

504. The licensee is responsible for the adequate supervision of design functions and designers. STUK can, as it deems necessary, examine the licensee's supply control documentation pertaining to the suppliers at the site and participate in inspections and audits on the licensee's design organisations. In assessing the need to participate, STUK takes into account a design object's safety significance, technical exactingness and earlier experiences of the designer and of licensee procedures for assessing design functions. [2019-03-15 ]

505. STUK can focus its own inspections directly on organisations responsible for the nuclear facility's design. In such cases, the inspection item is significant for safety, e.g. the design

functions of the company supplying the nuclear island. The inspections assess the functionality of the organisation's management system and the adequacy of the procedures. STUK's regulatory control is described in more detail in the field-specific and technology-specific YVL Guides. [2013-11-15 ]

## **5.2 Oversight of manufacturing, construction and installation**

506. STUK oversees the manufacturing, construction and installation of the nuclear facility and its safety-classified systems, structures and components in accordance with the procedures presented in the technology-specific YVL Guides. [2013-11-15 ]

507. STUK assesses the functionality of the licensee's management system and the adequacy and appropriateness of procedures to control manufacturing, construction and installation and also to take into account safety requirements during the various phases of the construction inspection programme (CIP) as well as in connection with control visits at the suppliers' premises and at the site. STUK may, in its oversight, examine the licensee's supply control documentation pertaining to the suppliers. [2019-03-15 ]

508. STUK assesses the adequacy of the licensee's actions to evaluate the risks incurred from and directed at construction operations. In accordance with para 314, a nuclear and radiation safety risk management plan pertaining to construction or plant modification projects shall be submitted to STUK for information in connection with the filing of a conceptual design plan for a construction or a plant modification project and always after the risk management plans have been updated. STUK shall also be reserved the possibility of examining the risk register in accordance with para 316. [2013-11-15 ]

509. STUK may, where necessary, conduct inspections at organisations engaged in manufacturing, construction or installation. In such cases, the object in question has safety significance. The inspections assess the functionality of the organisation's management system and the adequacy of the procedures. The results of the inspections are submitted to the licensee for information for the purpose of corrective actions. [2013-11-15 ]

510. The objective of product-specific inspections is that STUK can, based on their results, verify an object's conformity with the requirements. Authorised inspection bodies may also conduct conformity inspections assigned to them by STUK. In accordance with the principles presented in the licensee's management system, reports on non-conformances important for nuclear or radiation safety pertaining to products and functions are submitted to STUK for approval in accordance with para 371. [2013-11-15 ]

### **5.3 Oversight of commissioning**

511. STUK oversees the licensee's activities during commissioning and reviews commissioning related plans and result reports. [2013-11-15 ]

512. STUK witnesses commissioning tests on-site as it deems necessary. For the purpose of witnessing the tests, STUK shall be provided with testing schedules well in advance. STUK shall be informed without delay of any changes in the schedules. STUK shall be informed of the tests early enough but the presence of STUK's representative is not a precondition for conducting a test unless STUK has required so in its decision of approval concerning the testing programme in question. [2014-06-02 ]

513. Functional tests of components are part of the commissioning inspections described in the D and E Series of YVL Guides and STUK's inspections pertaining to them are described in the D and E Series of the Guides. [2013-11-15 ]

514. To ensure that the plant fulfils the requirements set for it STUK carries out an inspection in accordance with Section 20 of the Nuclear Energy Act (990/1987) before the nuclear facility's operation begins. Sections 3.7 and 4.6 of Guide YVL A.1 define the objective and contents of the inspection. [2019-03-15 ]

515. STUK oversees the loading of nuclear fuel and inspects upon completion, whether it has been performed in accordance with the loading plan and that compliance of the loading with the plans has been verified in the way required in the licensee's management system. [2013-11-15 ]

515a. STUK specifies, in connection with the review of the commissioning documents, the power levels, the transfer to which requires applying approval from STUK according to requirement 442. [2019-03-15 ]

### **5.4 Oversight of reporting during construction**

516. STUK reviews the reports required in section 3.8.2 of the present Guide, which have been submitted by the licensees for information and, based on the reports, assesses that legislation and STUK's requirements are complied with in the nuclear facility's construction. Reporting is a form of regulatory oversight complementing other procedures, such as control visits and inspections at the site. [2013-11-15 ]

517. STUK assesses in reviewing the reports that adequate records of the nuclear facility's construction and safety-significant events during construction are maintained to facilitate event

analysis also afterwards. [2019-03-15 ]

518. Based on the reports, STUK assesses the performance of construction, the safety-significance of events and the need for action or facility modifications as well as the need to communicate safety and quality related events outside STUK. [2013-11-15 ]

519. Based on the reports submitted by the licensees and in accordance with internationally agreed principles, STUK prepares its own reports and publications on safety-significant events or observations for submission to the IRS system (Incident Reporting System) jointly operated by the International Atomic Energy Agency (IAEA) and the Nuclear Energy Association of the OECD countries (NEA) and to the ConEX system (Construction Experience Programme) and pertaining to severity classifications to the IAEA's INES classification system (International Nuclear Event Scale). [2013-11-15 ]



## 6 Appendix A Special requirements for the monthly report on nuclear facility construction

A01. At least the following shall be included in the monthly report on construction:

- status of facility/plant detailed design
  - progress of design, including a design status overview for different fields of technology (civil construction, process, electrical and I&C technology, main components)
  - a summary of changes in the design of safety-classified systems, structures and components
- facility construction status
  - progress of construction, equipment manufacturing, installation and commissioning
  - a summary of changes in the manufacturing, installation and commissioning of safety-classified systems, structures and components
  - the construction project up-to-date overall schedule and a detailed schedule for the next two months
- demonstration of safety and licensing
  - a summary of significant tests and analyses to verify facility safety as well as their results
  - items pending a STUK decision, which are significant for project progress
- occupational safety at the construction site and a list of the most important occupational safety related observations and events
- suppliers and subcontractors
  - planned supplier audits and assessments
  - changes in the most significant supplier organisations
- the licensee management system and organisation
  - new and updated documents covered by the management system
  - status of internal audits and other management system assessments (plan/realisation)
  - changes in the licensee's project organisation (recruitments, decrease in the number of personnel, etc.)
  - progress in recruitment and training of the personnel necessary for operation
- non-conformances and significant observations
  - a summary of the non-conformances regarding the design, manufacturing,

installation and testing of the facility's safety systems as well as of the non-conformances of the accident analyses relating to their functioning

- a summary and list of the significant quality non-conformances and safety-related observations observed in the licensee's own operations
- a summary and list of the significant quality non-conformances and safety-related observations observed in the operations of suppliers and their subcontractors
- a summary of the product non-conformances in safety-classified systems, structures and components
- a list of significant non-conformances regarding products in safety classes 1–3.

[2019-03-15 ]

A02. A monthly report on construction shall be submitted to STUK for information by the 15th of the month following the reporting period. [2013-11-15 ]

## 7 References

1. Nuclear Energy Act (990/1987). [2013-11-15 ]
2. Nuclear Energy Decree (161/1988). [2013-11-15 ]
3. Radiation and Nuclear Safety Authority Regulation on the Safety of a Nuclear Power Plant (STUK Y/1/2018). [2019-03-15 ]
4. Radiation and Nuclear Safety Authority Regulation on the Safety of Disposal of Nuclear Waste (STUK Y/4/2018). [2019-03-15 ]
5. IAEA Specific Safety Requirements SSR-2/1, Safety of Nuclear Power Plants: Design. [2013-11-15 ]
6. IAEA Specific Safety Requirements SSR-2/2, Safety of Nuclear Power Plants: Commissioning and Operation. [2013-11-15 ]
7. IAEA Specific Safety Guide SSG-38, Construction for Nuclear Installations. [2019-03-15 ]
8. IAEA Specific Safety Guide SSG-28, Commissioning for Nuclear Power Plants. [2019-03-15 ]
9. SFS-EN ISO 9000:2015, Quality management systems. Fundamentals and vocabulary. [2019-03-15 ]
10. SFS-EN ISO 9001:2015, Quality management systems. Requirements. [2019-03-15 ]
11. SFS-EN ISO 10006:2003, Quality management systems. Guidelines for quality management in projects. [2013-11-15 ]
12. SFS-EN ISO 21500:2012, Guidance on project management. [2013-11-15 ]
13. SFS-EN ISO 31000:2011, Risk management – Principles and guidelines. [2013-11-15 ]
14. ANSI/PMI 99-001-2008, A guide to the project management body of knowledge. [2013-11-15 ]

# Definitions

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## **Subcontractor**

Subcontractor shall refer to a supplier that is not in a direct contractual relationship with the licensee or licence applicant.

## **Pre-criticality tests**

Pre-criticality tests shall refer to tests that can only be performed after nuclear fuel has been loaded, but before the reactor is made critical. These include for example testing the pressure loss of the main circulation flow and control rod movement using actual core geometry.

## **System performance tests**

System performance tests shall refer to tests that ensure that systems and their components function as planned. System performance tests include both the testing of single systems and the joint functional tests of multiple systems.

## **Commissioning testing**

Commissioning testing shall refer to tests that ensure that the plant and its systems, structures and components function as planned. Commissioning testing is part of the commissioning. For a nuclear power plant, commissioning testing can be divided into the following main parts, for example: system tests, fuel loading and pre-criticality tests, making the reactor critical, lower power tests, and power tests.

## **Commissioning**

Commissioning shall refer to the measures to verify the appropriateness of the licensee's organisation as well as the planned operation and safe use of the plant and its systems, structures and components.

## **Plant modification**

Plant modification (plant modification project) shall refer to a modification to the safety-classified systems of an operating nuclear facility that calls for the reassessment of the design bases and safety requirements of systems, the renewal of the design basis analyses, and considerable equipment acquisitions. Examples of plant modifications include a power increase of the reactor or a modernisation of the protection I&C systems.

## **Modification**

Modification shall refer to introducing changes to a system, structure or component so that it no

longer corresponds to previous specifications.

### **Low power test**

Low power tests shall refer to tests performed at low power after nuclear fuel has been loaded into the reactor, with the objective of ensuring that the reactor core behaves as expected, that the plant and its systems, the reactivity control systems in particular, operate as intended, and that it is safe to proceed to higher power levels. During the tests, the reactor power shall remain at the lowest possible level where the necessary parameters can be reliably measured.

### **Project**

Project shall refer to a unique process consisting of a set of coordinated and controlled activities with start and finish dates, undertaken to achieve an objective conforming to specific requirements, including the constraints of time, cost and resources. (SFS-EN ISO 9000:2015) Projects include for example construction projects of new nuclear facilities or plant modification projects launched to implement extensive modifications.

### **Making the reactor critical**

Making the reactor critical shall refer to the following actions:

- in a pressurised water reactor, the boron dilution from primary coolant is begun;
- in a boiling water reactor, the withdrawal of the first control rod from the reactor is begun.

### **Risk management plan**

Risk management plan specifying the approach, the management components and resources to be applied to the management of risk. Risk management components typically include procedures, practices, assignment of responsibilities, sequence and timing of activities.

### **Risk register**

Risk register shall refer to the records of identified risks, including results of analysis and planned responses.

### **Supplier**

Supplier shall refer to an organisation or person manufacturing or providing a product or service. (SFS-EN ISO 9000:2015)

### **Supply chain**

Supply chain shall refer to all resources, processes and functions that are required to create products. These may include the design of the product, and the manufacture, assembly and delivery of material and components.

### **System/structure/component important to safety**

System/structure/component important to safety shall refer to systems, structures or components in safety classes 1, 2 and 3 and systems in class EYT/STUK.

**Construction of a nuclear facility**

Construction of a nuclear facility (construction project) shall refer to the measures that the holder of a construction licence has taken in order to construct a nuclear facility that conforms to the requirements set until the end of the commissioning of the facility.

**Construction project for a nuclear facility**

Construction project for a nuclear facility shall refer to the construction of a new nuclear facility or modifications at an operating nuclear facility (including commissioning).