EUR pre-assessment
55 key requirements of EUR revision D

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Rev D Key Isues number	Topic	EUR chap Rev D	EUR section rev D	Summary of the EUR requirements - Rev D	Compliance analysis	Label
1	**Operational staff doses during Normal Operation and Incident Conditions**	2.1	2.3	The Plant Designer* shall demonstrate that for the operational staff, the following objectives for annual effective doses, including doses due to all relevant activities like maintenance, repairs, equipment changes, refuelling, In-Service Inspections, etc. can be met:... 2. Collective effective dose The collective effective dose shall be ALARA. The Target* for annual collective effective dose averaged over the plant life is 0,5 man.Sv per Unit*.		
2	**Off-site release targets for Severe Accidents**	2.1	2.5.1.	The radiological release Targets* for the Severe Accidents* shall be the Criteria for Limited Impact*.		
3	**Off-site release targets for complex sequences**	2.1	2.5.2	The radiological release Targets* for the Complex Sequences* considered as DEC shall be the Criteria for Limited Impact* However, the Plant Designer* should aim at meeting the Design Basis Category 4 Condition* release Targets*, where reasonably achievable.		

4	**Probabilistic safety targets for plant design**	**2.1**	**2.6**	In accordance with the safety policy described before, EUR sets probabilistic quantitative design Targets* as follows: • Core Damage* cumulative frequency shall be lower than 10-5 per reactor year, • Cumulative frequency of exceeding the CLI defined in Appendix B shall be lower than 10-6 per reactor year, • Sequences potentially involving either the early failure of the Primary Containment* or very large releases shall have a cumulative frequency well below the previous Target* of 10-6 per reactor year.		
5	**Probabilistic safety assessment methodology**	**2.1**	**2.7**	Probabilistic Safety Assessment (PSA) shall be used in accordance with the detailed requirements, methodology and data set in Chapter 2.17 to verify the compliance of plant design with the probabilistic Targets*. In addition, it shall also be used for other purposes such as: • to identify the reliability of equipment and systems required to cope with Severe Accidents*, • to complement the deterministic approach in assessing the probability of initiating events and of events combinations, • to identify the Complex Sequences* to be considered as DEC and addressed in the design, • to support the definition of Technical Specifications* and emergency procedures, • to achieve a balanced design.		

6	**Single Failure Criterion**	**2.1**	**3.4**	The SFC shall be applied to each Assembly of Equipment* which performs all actions required to fulfil a level F1 function for a given initiating event in order that the limits specified in the design basis for that event are not exceeded. The need to apply SFC to level F2 functions should be determined on a case by case basis. The Designer* shall implement specific design provisions to avoid and inhibit spurious actuations of plant automation unless probabilistic arguments can be deployed to show it to be unreasonable. The Designer* shall provide an assessment of such design provisions (permissives, interlocks, priority Rules* among signals, voting logic principles, etc.) implemented in Instrumentation and Control (I&C) and Human-Machine Interface (System) (HMI) design. Comment: Spurious automatic action, if threatening reactor safety, will be dealt with automatic protective action. Single Operator* errors shall not be considered as a single failure.		
7	**Design Extension Conditions**	**2.1**	**4.1**	The DEC shall be selected by the Plant Designer* with the basic aim of meeting all the EUR probabilistic safety objectives (Core Damage* frequency, cumulated frequency of exceeding the Criteria for Limited Impact* and residual frequency of early and/or very large releases). On this basis the Plant Designer* shall define a first set of Design Extension Conditions*. Then the Plant Designer* shall use probabilistic methods to identify those other design measures that may be needed to meet the EUR probabilistic objectives, together with the associated Design Extension Conditions.		

8	**General assessment rules for DEC**	**2.1**	**4.2 A.C**	Qualification of components and systems, as required for those coping with Design Basis Conditions*, does not necessarily apply. However, demonstration of capability of performing required actions and Survivability* in DEC shall be provided by the Plant Designer*. Therefore claims may be made for components and structures, other than Safety Category I. In particular, Safety Category II Equipment* can be credited at any time in DEC and, where justified, Non-Safety equipment after 72 hours.		
9	**independence of equipment DBC/DEC**	**2.1**	**4.2 AD**	Equipment needed to mitigate a Severe Accident* should be independent of the equipment provided to fulfil DBC requirements. If equipment and systems used to cope with DBC are supplemented by additional equipment in DEC, the latter equipment shall be independent, to the extent possible, from the equipment claimed in the DBC. Where applicable, the same equipment may be claimed in coping with Complex Sequences* and in Severe Accident* mitigation.		
10	**Design earthquake**	**2.1**	**5.3.1**	The Standard Plant* shall be designed to withstand the effects of the Design Basis Earthquake* (DBE) and the reactor shall be capable of being shutdown to a Safe Shutdown State* and sufficiently cooled after such a Hazard*. Comment: Seismic input data associated with the DBE are specified at a level to cover the majority of the potential nuclear sites in Western Europe.		

11	**Resistance to aircraft crash**	**2.1**	**5.3.4**	The requirements related to aircraft crash are divided into two categories of induced events: • Accidental aircraft crash, • Intentional aircraft crash as a result of a human malevolent action, If a probabilistic analysis shows that the Hazard* of accidental aircraft crash cannot be neglected, e.g. when the site is near an airport, design provisions may be needed within the design base. Intentional aircraft crash is an extreme event which can only happen if several security defence layers have been breached. A probabilistic approach for this Hazard* is subjective and unrealistic. Therefore a deterministic approach is required. This event should be considered in the design but with less conservative design Rules* and analyses associated with design extension conditions. Although this event is not considered within the Design Basis Accident* (DBA), radiological consequences need to be limited. If a Standard Design* needs aircraft crash protection, direct and indirect effects of the aircraft crash shall be considered, in particular: • effects of direct and secondary impacts on mechanical resistance of safety structures and systems required to bring and maintain the plant in a safe state after aircraft crash, • effects of vibrations on safety structures and systems required to bring and maintain the plant in a safe state after aircraft crash, • effects of combustion and/or explosion of aircraft fuel on the integrity of the necessary structures and systems required to bring and maintain the plant in a safe state after aircraft crash.		

12	**Plant performance following DEC**	**2.1**	**6.6**	Complex Sequences* The design shall ensure the plant can reach a Controlled State*, and then a Safe Shutdown State*. The design should ensure the SSS can be reached within 24 hours, for any Complex Sequence*. In any case the Safe Shutdown State* shall be reached before 72 hours. It shall be possible to maintain the SSS indefinitely. 2. Severe Accidents* The plant design, associated with accident management provisions, shall allow the plant to reach a Severe Accident Safe State* (SASS) within one week from accident initiation. It shall be possible to maintain the SASS indefinitely. ADD Rev D definition for SASS In case of Severe Accidents* the plant achieves a Safe State if the following conditions are ensured: - core debris has solidified and temperature is stable or decreasing, - core debris heat is being removed and transferred to Heat Sink*, - debris configuration is such that Keff is well below 1, - the containment pressure is so low that, in case of a containment opening, the Criterion for Limited Impact* (CLI) would be met, - the evolution of fission products to the containment has ceased.		

13	**Autonomy in respect of operators**	**2.1**	**6.7.2**	The plant shall be designed in such a way that it meets the following autonomy objectives: The release Targets* of Design Basis Categories 2, 3 and 4 Conditions* and DEC can be met without Operator* action from the MCR in less than 30 minutes from the first significant signal, and no action outside the MCR in less than 1 hour (from the first significant signal). No site based mobile light equipment shall be required: • in less than 6 hours from accident initiation, for Core Damage* prevention actions in DEC, • in less than 24 hours from accident initiation, for containment performance assurance in DEC, • in less than 72 hours from accident initiation, in any DBC.		
14	**Autonomy in respect of heat sink**	**2.1**	**6.7.3 A**	Design provisions shall ensure adequate decay heat removal under DBC and DEC, for 72 hours without external support. The initial means ensuring decay heat removal shall last at least 24 hours. The design shall include provisions allowing additional means to ensure decay heat removal after 72 hours.		
15	**Autonomy on respect of power supply systems:**	**2.1**	**6.7.4 A**	The period of Independence* of the installation in relation to external electrical power supplies shall be at least 72 hours; this applies to Normal Operation* as well as Incident Conditions*, Accident Conditions* and DEC.		

16	**Classification of the Safety Functions**	**2.1**	**6.8.2.1 & 6.8.2.2**	Level F1 shall be subdivided into sublevels F1A and F1B according to the following criteria: • definition of Safety Functions* required to achieve and maintain a Controlled* or Safe Shutdown State*, • identification of equipment and structures involved in each function, • assignment of each item of equipment or each structure to a Safety Category, generally according to the highest safety level of function it has to perform, • assignment of each item of equipment or each structure (where relevant) to a code class, according to the code used for the design (see Chapter 2.5.). The Safety Functions* needed to maintain a Safe Shutdown State* beyond 24 hours and up to 72 hours from the initiating events in Design Basis Categories 2, 3 and 4 Conditions* shall be assigned to level F2.		
17	**duration of cooldown**	**2.2**	**2.1.1**	The plant should be capable of shutdown from Hot Zero Power* to Cold Shutdown* at a temperature less than 60°C within 16 hours and the cooling period shall be no longer than 24 hours. The removal of the Reactor Pressure Vessel* (RPV) head shall be achieved within: • 32 hours after reactor trip for BWR, • 72 hours after reactor trip for PWR.		
18	**duration of startup and loading**	**2.2**	**2.1.2**	The duration of the phase from Hot Shutdown* to synchronisation to the grid, including physical tests and criticality shall be less than 24 hours. The Designer* shall specify the loading times from synchronisation to full power after short shutdown (< 36 h), after long shutdown (> 36 h) and after refuelling outage. The maximum time of this loading phase shall be as follows: (see table 2.1.2 C)		

19	**Type of fuel**	**2.2**	**3.1**	The core design shall be optimised for UO2 Fuel Assemblies*. However, provisions shall be made to allow the use of up to 50% standard MOX Fuel Assemblies* in the core, the remainder being UO2 assemblies. See also chapter 2.8 section 2.8.2.2.1.1 Fuel inspection, handling and storage, particularly requirement 2.8. 2.2.1.1A: Fuel storage and handling functions shall be ensured in accordance with the requirements in Chapter 2.2 on fuel burn-up, MOX percentage and storage capacity."		
20	**Refuelling cycle**	**2.2**	**3.2**	The core design shall allow the flexibility of operating on fuel cycles with refuelling intervals from 12 months up to 24 months, assuming Refuelling-only Outage*.		
21	**Expected thermal margins**	**2.2**	**3.4.1**	The design of the core shall be capable of producing its Rated Power* under the combination of: • either 100% UO2 or 50% MOX cores, both of them with refuelling intervals and discharge assembly burnup, corresponding to the lowest Target* indicated for MOX and UO2, • capability of power distribution control, Load Following*, stretch-out and coast-down.		

22	**Low boron capability (PWR)**	**2.2**	**3.7**	The core should be subcritical in Hot Zero Power* conditions, by the use of control rods alone i.e. without soluble boron at any time during core life.		
23	**Load following and maneuvering capability**	**2.2**	**3.8**	The core shall be designed with the capability for Load Following* for the natural length of cycle and programmed load cycling as defined in Chapter 2.3.		
24	**Spent fuel storage capacity**	**2.2**	**5.1 A**	The total capacity of the spent fuel pool(s) or storage should be at least A + B + C + D cells, according to the following table:		
25	**Overall availability, outage duration**	**2.2**	**7.2.1 & 7.2.2**	As a design objective, the average annual Design Availability Factor* shall be greater than 90% for a fuel cycle length equal or longer than 12 months. The Planned Outages* should be completed (breaker-to-breaker) in less than: • 16 calendar days for refuelling and regular maintenance outage, • 24 calendar days for main turbine-generator overhaul, • 36 calendar days for In-Service-Inspection Outage*.		
26	**Voltage and frequency operation fields**	**2.3**	**1.2**	The rated frequency shall be 50 Hz. The Unit* shall not disconnect automatically from the grid within the limits defined in Figure 1.		
27	**Plant Design Life**	**2.4**	**2.A**	The plant shall be designed for a lifetime of 60 years. The design of the plant shall be optimised in order to meet this plant lifetime requirement. This optimisation will take into consideration the following: For the Reactor Vessel* and all major structures which are not replaceable, such as the containment, the Designer* shall present		

				the margins for Design Lifetime* longer than 60 years.		
28	**Implementation of the Break Preclusion concept on the main coolant lines**	**2.4**	**5.10**	Main coolant pipelines shall be protected against high energy piping break. Shortened EUR comment: Different ways of meeting the Protection of high energy piping break requirement meeting are available: LBB or BP		
29	**Implementation of the Break Preclusion concept on the main coolant lines - Break preclusion of main coolant-line**	**2.4**	**5.10.1**	In order to claim main coolant-line Break Preclusion*, the Designer* shall prove that no degradation mechanism (e.g. fatigue, corrosion, stress corrosion cracking, flow accelerated corrosion) can cause the pipe rupture. Where Break Preclusion* is claimed, the following measures shall be implemented: • the design of the main coolant lines shall be based on a comprehensive assessment of the operating conditions and potential damaging modes, • the stresses shall be assessed in a reliable manner, • the materials and manufacturing processes shall be selected and qualified to match the environmental conditions and yield a high quality product, • both tensile and fracture material properties shall be gained by material test. Material test shall cover 3 samples from each heat used on the piping, • the material shall exhibit high toughness properties over the entire range of operating		

				conditions; aging embrittlement of the base material and welds shall be taken into account in the Break Preclusion* demonstration, • during manufacturing, the main coolant-line parts and representative coupons shall be subjected to extensive and redundant destructive and non-destructive tests, • the appropriate mechanical codes for primary components shall be complied with, • the Quality Assurance* system shall meet the requirements as given in Chapter 2.15, • ISI shall be performed in order to contribute, as an additional safeguard, to reducing the probability of occurrence of large Defects*. Two diverse and independent means shall be provided to meet the requirements of leak detection capability. The systems shall provide alarms in the Main Control Room*.		
30	**Soil properties for seismic analysis**	**2.4**	**6.4.2**	The founding medium shall be treated as an elastic isotropic homogeneous half space. The table of the mechanical properties given in the following section shall be used in the analysis. Based on this table, nine typical sites are identified, three in each site category: soft, medium and hard. The ground motion spectra, associated with the three site categories, shall therefore each be used for three identified sites.		

31	**codes & standards (see also chapter 2.5)**	**2.5**	**2 & 3**	For each Standard Design*, and for each individual project, a list of applicable Rules* shall be developed, as described below. For a Standard Design*, the Designer* shall provide a preliminary list of the main Rules* to be included in Volume 3 and make the assessment of this list of Rules*, considering interferences with other EUR requirements. The proposed set of applicable Rules*, Codes and Standards* shall be consistent for each part of the design and compatible between all parts.		
32	**Cobalt content for materials in contact with the reactor coolant**	**2.6**	**4.1.2**	the cobalt content of all materials in contact with the reactor coolant, including systems connected to the RCS, shall be minimised to avoid activation in the core radiation field of entrained corrosion products leading to production of cobalt 60: – high-cobalt alloys such as stellites shall not be used for valve seat hard-facing materials in systems in contact with reactor coolant. Cobalt-free hard-facing alloys currently developed and proven shall be used. The Designer* shall assess possible alternatives and shall provide justification of the chosen solution, – cobalt-based materials shall not be used in Reactor Vessel* internals, – specifications of the maximum cobalt present as impurity in materials shall be proposed by the Designer* for all internal surfaces of the RCS. For Steam Generator* (SG) tubing, the maximum tube bundle average cobalt content should be limited to 150 ppm. For Boiling Water Reactor (BWR) plant, the cobalt content in the main exchangers (main condenser and feed water heaters) should be limited to 200 ppm.		

33	**Fuel Compatibility requirements**	**2.7**	**11.4**	The FA design shall assure compatibility with: - the fuel channel, if any, - the associated core components, - the core internals, - the fuel handling route, - FAs from different manufacturers, - the fuel cycle back-end cycle, fuel storage, shipping and reprocessing.		
34	**Diesels generators I&C principles**	**2.7**	**13.2.2**	Diesel generators shall be designed to start up automatically on: • voltage drop to the emergency power busbar, • initiation of active Engineered Safety Features (ESF)*. They shall also be designed for manual start up: • from the Main Control Room (MCR)*, or • using local controls (following operator authorisation from the MCR). Switch-over of safeguard auxiliaries shall be automatic on loss of voltage to the emergency busbars. Reconnection to the off-site source and diesel generator shutdown shall be done manually.		
35	**system design objectives for short outage**	**2.8**	**1.5.2**	In order to meet the average duration for the planned outage for refuelling and regular maintenance, commencement of fuel discharge shall be in accordance with the duration specified in Chapter 2.2. For planned outage of a PWR, duration for boration following reactor shutdown shall be about 5 hours. The vessel head shall be cooled as soon as possible to enable preparation for vessel opening. From Hot Shutdown Modes*, in Design Basis Category 1 Conditions*, the heat shall be removed by power generating systems with a cooling rate of about 55°C/hour. Controlled cooling should be used to reach		

				this objective. For PWR, the Reactor Coolant System*, specifically the reactor coolant pumps and pressurizer, should be designed to allow a two-phase cooling process from Hot Shutdown* to Cold Shutdown Modes*.		
36	**design of the liquid & gaseous waste collection systems**	**2.8**	**2.2.4.3**	The following functions shall be provided: • selective collection and Segregation* of liquid and gaseous effluents produced by the RCS, nuclear auxiliary systems, Reactor Cavity* and spent fuel pool, as well as of all potentially-contaminated liquids produced in the plant (such as floor drains, laundry and decontamination waste), • routing of the collected waste to the storage and processing facilities, • capability for re-injection of highly contaminated liquids from the auxiliary buildings, or Secondary Containment*, into the Primary Containment* in DBC and DEC, if the amount of fluids may exceed the waste treatment capacity.		

37	**RCS arrangement and mid-loop operation**	**2.8**	**3.3.1.3.2 & 1.5.2 I**	RCS and connected systems shall be designed and laid-out to satisfy the following requirements: • no piping should be connected to RPV below the Top Of Active Fuel level (TOAF). Nevertheless, if some small piping are located in the RPV bottom head, it shall be demonstrated that it is impossible to drain out water down to less than TOAF level during shutdown states, Nevertheless, if mid-loop operation has to be used (i.e. for gas sweeping before opening the vessel), it shall be demonstrated, by the Designer*, that functionality of residual heat removal systems is not impaired		
38	**Design of the normal RHR system**	**2.8**	**3.4.1.3.3 3.4.1.3.4 3.4.1.3.5**	The NRHRS shall be designed for absolute working pressure equal as minimum to the pressure when NRHRS is connected to the reactor coolant circuit, the working temperature being not less than 150°C. If the NRHRS is partly located outside the Primary Containment*, the design temperature and pressure should be higher than above to prevent containment bypass. In order to avoid having contaminated fluid circulating outside the Containment System*, the location of the entire NRHRS should be inside the Containment System* (including Primary and Secondary Containment*). If the NRHRS is not entirely located inside the Primary Containment*, the portions of the system which connect directly to the RCS and circulate core coolant outside the Primary Containment* shall be designed: • either to ensure that its ultimate rupture strength will not be exceeded at full RCS pressure, maintaining the operability of the system, or • with automatic high-reliability provision for isolation.		

39	**Nuclear sampling system design: post-accident sampling**	**2.8**	**3.5.4.3**	The system shall be designed to function in all DBC and DEC. The system design shall allow reactor coolant and containment atmosphere sampling within 24 hours from reactor scram. If analysed inside auxiliary buildings, or Secondary Containment*, re-injection of highly radioactive samples to Primary Containment* shall be provided if there is a risk to exceed the treatment capability of such a waste.		
40	**Independence and separation of system divisions**	**2.8**	**4.1.5 A**	Each Division shall be independent and separated from other Divisions* both mechanically and electrically and shall be provided with physical protection against internal Hazards*. Cross-connections between Divisions* of equipment which perform Safety Functions* should be avoided unless an improvement in safety, operability or availability is demonstrated. Only very few exceptions shall be accepted based on a probabilistic safety analysis. Interconnections between Divisions* of different systems should be avoided.		
41	**Containment system general configuration**	**2.9**	**2.1**	The Containment System* shall include a Primary Containment* and a Secondary Containment* as defined in Volume 1, Appendix B. For the case of PWRs, the Primary Containment* shall be of the large dry type. The acceptable technologies for the Primary Containment* shall be: • metallic, • reinforced concrete with liner, • concrete pre-stressed with liner.		

42	**In-containment FP reduction mechanisms**	**2.9**	**2.2.1.1**	With regard to reduction of fission products in the long term, the Designer*shall demonstrate that after a Severe Accident* water pools inside the containment remain at a pH over 7 taking into account the contribution of all acidic and basic substances which could affect the pH. Consideration shall be given to a pH control system with permanent storage of soluble buffering substances at appropriate locations at the plant site. Their mixing rate shall also be addressed.		
43	**Secondary containment performance**	**2.9**	**2.2.1.3 2.2.1.4**	The design of the Secondary Containment* shall be effective for hold-up and deposition of fission products, if its volume is not maintained sub-atmospheric during an accident. Secondary Containment Bypass* leakage should not exceed about 10% of the integrated design Primary Containment* leakage for any DBC or DEC.		
44	**on-line monitoring of the containment leak rate**	**2.9**	**2.2.2.1.4 4.1.11**	Means shall be provided to enable the Operators* to perform checks for gross leakages from the Primary Containment* during Normal Operation*.		
45	**in-vessel debris cooling ex-vessel debris cooling**	**2.9**	**3.1.8.2 3.1.8.3**	The Designer* shall evaluate the possibility of corium cooling by In-Vessel Retention* (IVR). If the IVR is not fully demonstrated, specific provisions shall be provided to assure corium coolability outside the vessel. The Designer* shall prove that the corium will not jeopardise the civil structures and equipment needed for mitigation of Severe Accidents* consequences. Molten core-concrete interaction shall be limited to avoid basemat meltthrough.		

46	**Containment spray system configuration**	**2.9**	**4.1.2.1** **4.1.1.1.1**	The Designer* shall simplify the CSS to the extent possible. In particular the Designer* shall avoid recirculation of contaminated water outside the Containment System*.		
47	**High-Energy lines within the Secondary Containment**	**2.9**	**4.2.2**	Sections of High-energy lines* included in the Secondary Containment*, the rupture of which may produce significant pressurisation of the Secondary Containment*, either shall be provided with a double pipe to channel any energy releases from such a pipe break inside the Primary Containment* or its rupture shall be excluded by appropriate design, manufacturing and testing.		
48	**Functional Requirements for I&C Design**	**2.10**	**5.1**	I&C systems shall be categorised according to DiD levels presented in Chapter 2.1. The safety important I&C functions and systems shall be divided into an I&C architecture, which includes four identifiable parts corresponding to the levels one to four of DiD as defined in Chapter 2.1. The isolation, separation and Diversity* principles between these parts and allocation of Safety Functions* to these separate parts shall be defined according to plant specific analyses by the Designer*.		

49	**Diversity for software-based systems**	**2.10**	**5.3.1.5**	In particular Diversity* shall be provided where software-based systems are employed, including the HMI. This shall involve hard-wired or Field-Programmable Gate Array (FPGA) -based back-up systems or diverse software where this can be shown to achieve the required reliability. The implementation of functional Diversity*, application software Diversity* and equipment Diversity* shall be performed deterministically and/or on the basis of the assessed CCF risk and in connection with the Probabilistic Safety Assessment (PSA, see Chapter 2.1).		
50	**I&C systems technology**	**2.10**	**6.1.1**	Due to the advantages offered by available advanced technology, the use of modern technology should be preferred. Commercially available off-the-shelf components should be used as far as reasonable for implementing the systems and equipment included in Non-Safety (NS) category. Commercially available, off-the-shelf equipment should also be used for Safety Systems* if they meet safety equirements e.g. quality and qualification requirements for hardware and software. The selection of systems and equipment shall be standardised so that the variety of equipment is limited as far as reasonable to facilitate maintenance and training, to simplify spare parts requirements and to support easy replacement and upgrading of the I&C equipment.		

51	**design of I&C category L1A equipment Level III rules**	**2.10**	**7.3.3**	The Designer* shall identify the Deviation* from the applicable level III documents specified below. The Designer* shall also identify any additional level III documents necessary to apply in order to fulfil all of the EUR requirements. The design of the safety I&C and its verification and validation shall be performed according to relevant standards such as IEC 61513, IEC 60880 and its part 2 as well as standards such as IEC 60780, IEC 60980, IEC 60987 and ISO 9000 (ISO 9000-3). The design of the MCR and its verification and validation shall be performed according to relevant standards like IEC 60964 and its supplements as well as standards such as IEC 61227, IEC 61771 and IEC 61772. The ECR shall be designed according to relevant standards such as IEC 60965.		
52	**escape routes**	**2.11**	**1.2.3.1**	The following values on escape route width should be used as general guidance to design the escape routes. (see tables in 2.11.1.2.3.1		

53	**Construction time targets / Project time schedule optimisation**	**2.13**	**2.2**	The Designer* shall achieve an overall construction as short as possible reflecting the best investment case and should Target* an achievable documented construction programme less than 60 months.		
54	**fire areas and fire zones fire isolation of the MCR remote shutdown panel**	**2.11**	**2.4.2**	Fire Areas* and Fire Zones* shall be incorporated into the overall layout and building layouts to restrict the impact of fire on safety equipment. Rooms containing safety computer equipment that is not part of the control room complex shall be separated from their redundant backups and from other areas of the plant by allocation of Fire Areas*. The control complex shall be separated from the remainder of the plant by Fire Barriers* on the walls, ceilings and floors. Peripheral rooms in the control complex shall be separated from the MCR by the allocation of Fire Areas*. The separation of redundant systems inside the MCR shall be achieved by Fire Zones* and partial Barriers*. Allocation of Fire Areas* for redundant shutdown systems inside the Containment System* shall be achieved by distance and the risk reduced by limiting the combustible		

				loading and providing fire detection and suppression systems designed on the basis of fire Hazards* analyses. Fire Barriers* shall not impede access to safety categorised equipment.		
55	**basic requirement for quality assurance**	**2.15**	**1**	The general QAP of the project as well as management processes and QAPs of Contractors*, Subcontractors* and review organisations shall be in accordance with the requirements of the nuclear specific standard IAEA GS-R-3 "The Management System for Facilities and Activities" of 2006. European standard EN ISO 9001 issued in 2008 "Quality management systems - Requirements" shall also be used in the development of detailed requirements to the quality processes and procedures for products and services for design, purchasing, manufacturing, construction, installation, erection, testing, commissioning and operation. In case of possible contradiction in the implementation phase the nuclear specific features of the IAEA GS-R-3 standard shall be mandatory.		