

Consulting Services

Safety Design Classification of Fuel Handling System for the EUR Applicability

June 2018

The following will define the details of the purpose, scope of consulting services, consulting schedule and quality assurance in order to develop the requirements of fuel handling equipment for pressured water reactor (PWR).

1. PURPOSE

The purpose of the consulting services is to perform the technical advices related to clarification of safety class & seismic category for fuel handling system (FHS) and application of fuel shuffling during refueling outage in Europe and U.S.A.

2. DESIGN INFORMATION

The PWR FHS design for Korea and other countries may have technical differences, including safety class & seismic category classification and refueling procedures. For example, fuel handling equipment (listed on the Table 1), for Korea Standard Nuclear Power Plant (KSNP), are designed as non-nuclear safety and seismic category II and all fuels are removed from the reactor vessel and transferred to spent fuel storage racks for the fuel inspection during the refueling outage. However, it is necessary to review the appropriateness of applying the mentioned requirements to FHS design for Czech or UK nuclear power plants. Regarding to the fuel shuffling, European requirements, EUR Rev. D, Vol. 2, Chap. 7, describe it as one of the requirements.

3. SCOPE OF SERVICES

3.1 CONSULTATION ITEMS

3.1.1 SAFETY CLASS AND SEISMIC CATEGORY OF FUEL HANDLING SYSTEM

- a) Providing the information on the Safety Class and Seismic Category of fuel handling equipment (listed on the Table 1) for FHS of PWR in Europe and U.S.A.

Table 1. Fuel Handling Equipment

No.	Equipment for FHS	Location
1	Refueling Machine	Containment Building
2	Spent Fuel Handling Machine	Fuel Handling Area of Aux. Building
3	Fuel Transfer System (including Fuel Transfer Tube & Blind Flange)	Containment Building & Fuel Handling Area of Aux. Building
4	CEA Change Platform, If supplied	Containment Building
5	Pool Seal Assembly	Containment Building

6	New Fuel Elevator	Fuel Handling Area of Aux. Building
7	CEA Elevator, If supplied	Containment Building
8	Neutron Source Handling tool	Fuel Handling Area of Aux. Building
9	Spent Fuel Handling Tool	Fuel Handling Area of Aux. Building
10	New Fuel Handling Tool	Fuel Handling Area of Aux. Building
11	CEA Handling tool	Containment Building

- Providing the status of safety class and seismic category of fuel handling equipment in Europe and U.S.A. and the brief descriptions of overall procedure regarding the status.
 - Providing the technical grounds on the safety class and seismic category of fuel handling equipment in Europe and U.S.A.
- b) Recommending on the FHS Safety Class and Seismic Category for participating in the construction of Europe (including Czech and UK) PWR.
- Recommending the safety class and seismic category of fuel handling equipment (listed on the Table 1) for participating in the construction of Europe (incl. Czech and UK) PWR. and the technical grounds of classification.
 - Recommending the required equipment (and safety class and seismic category thereof) for participating in the construction of Europe PWR. (if, required equipment is necessary).
- c) Providing the Europe and other requirements for Safety Class and Seismic Category for FHS.
- Providing the code, standard, report, example and etc. related to safety class and seismic category of fuel handling system.
 - Providing the requirements (for design, performance, interface, instrumentation, control, test and etc.) in conformity with the safety class and seismic category classification of fuel handling equipment in Europe PWR.

3.1.2 FUEL SHUFFLING DURING THE REFUELING OUTAGE

- a) Providing the information on the status of In-core shuffling application in Europe PWR plants
- Providing the status and reason of in-core shuffling application in Europe PWR plants.
- b) Providing the information on the regulatory and utility requirements in Europe for In-core shuffling application.
- Providing the code, standard, report, utility requirement and etc. related to in-core shuffling in Europe.

- Providing the technical grounds or legal basis of in-core shuffling application in Europe PWR plants.
- c) Recommending on the required equipment and structures, such as intermediate fuel rack in containment building, and on Safety and Seismic Class/Category, if In-core shuffling shall be applied.
 - Providing the required equipments (and brief description thereof) in conformity with Europe regulation
 - Recommending the classification of safety and seismic for required equipment. Reason or logical basis for selection of safety and seismic classification.
- d) Recommending on the required interface requirement for Refueling Machine, if In-core shuffling shall be applied.
 - Providing the characteristic on design of refueling machine with function of in-core shuffling.
 - Recommending the requirements for the design and the interface of refueling machine with function of in-core shuffling in conformity with Europe regulation.

3.1.3 THE REQUIREMENTS FOR SAFETY RELATED COMPONENTS

- a) Recommending on the required code & standards (including structure, mechanical, electric, instrumentation, material, cleaning, painting requirement)
- b) Recommending on the safety-related components, for example, In case of Refueling Machine which is classified as safety-related, the bridge drive motor and rail, etc., should be classified as safety-related components or not.

3.1.4 REQUIREMENTS FOR NON-SAFETY RELATED COMPONENTS

- a) Recommending on the required code & standards (including structure, mechanical, electric, instrumentation, material, cleaning, painting requirement)

4. DELIVERABLES

The deliverables by the Contractor under this contract will be as follows:

- a) Draft compilation report including activities for requirement.
- b) Meeting minutes of the meeting at the Contractor's office.

- c) Final compilation report that includes the comment resolution from one iteration of review comments on draft compilation report.
- d) The Contractor will transmit the complete final compilation report with other items such as meeting agenda and minutes to KEPCO E&C in word or pdf format.

5. CONSULTING SCHEDULE

A draft report shall be submitted by the Contractor to KEPCO E&C within 8 weeks after the date of contract. The schedule below is determined from the date of the signed contract and depends on the dates to be selected for the meeting at the Contractor facility

ACTION ITEMS	SCHEDULE (WEEK)											
	1	2	3	4	5	6	7	8	9	10	11	12
Requirement for FHS												
Submittal of Draft Report								★				
KEPCO E&C Comments on Draft Report												
Meeting at Contractor Office												
Submittal of Final Report												

* Submittal of the draft report will be eight (8) weeks after the contract signature date. The final report will be completed in two (2) weeks after the end of the meeting at the Contractor's facility.