
REVISED RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

APR1400 Design Certification

Korea Electric Power Corporation / Korea Hydro & Nuclear Power Co., LTD

Docket No. 52-046

RAI No.: 403-8454
SRP Section: 06.01.01 – Engineered Safety Features Materials
Application Section: 6.1.1
Date of RAI Issue: 02/10/2016

Question No. 06.01.01-1

Title 10 of the Code of Federal Regulations (10 CFR) Part 50, Appendix A, General Design Criteria 1 and 30; and 10 CFR Part 50.55a contain provisions regarding quality standards for material specifications that are met by compliance with the applicable provisions of the ASME Boiler and Pressure Vessel Code (ASME Code) and by acceptable application of materials Code Cases as described in Regulatory Guide (RG) 1.84, “Design, Fabrication, and Materials Code Case Acceptability, ASME Section III.” Specifications for permitted materials are identified in the ASME Code, Section III, Appendix I, or described in detail in the ASME Code, Section II.

On November 13, 2015, the applicant provided supplemental information (ML15321A271) which clarified information in the original application and responded to issues identified by the staff. Table 6.1-2 on page 6.1-18 was supplemented with material specifications for the In-Containment Water Storage System.

In this table the IRWST and the HVT are specified to use ASTM A-240 Type 304 stainless steel.

In FSAR Table 3.2-1, the applicant states that the code of construction for these components is ASME Section III, Division 2. This information is consistent with FSAR Section 6.8 which states:

“The IRWST and HVT are reinforced concrete structures with a stainless steel liner on surfaces expected to be in direct contact with borated water.”

The liner material requirements for an ASME Section III, Division 2 component are specified in CC-2511. CC-2511 references Appendix I, Table I-2.2 which does not include the ASTM specification but does allow the ASME specification.

ASME Section III, Sub-article NCA-1220 permits the use of ASTM material with conditions. However, the applicant does not invoke NCA-1220 for this material in the FSAR.

As such the staff has two requests:

- 1) Does the ASTM A-140, Type 304 material specification apply to the IRWST and HVT liners only? If so, update Table 6.1-2 to specify “IRWST Liner” and “HVT Liner.”
- 2) Provide an explanation how the ASTM A-240, Type 304 material complies with ASME Section III, Division 2, paragraph CC-2511.

Response – (Rev. 1)

- 1) ASTM A-240, Type 304 material specification applies only to the liner material in the IRWST and the HVT. DCD Tier 2, Table 6.1-2 and Section 3.8.3.6.3 will be revised to specify the specification applies to the IRWST and HVT liners, as shown in the attachment associated with this response.
- 2) The primary function of the liner for the IRWST and the HVT is to provide a leak-tight barrier against the possible leakage of borated water. This function is similar to the role of leak-tightness of the liner plate in containment. Therefore, the stainless steel liner plate(SSLP) for the IRWST and the HVT is designed in accordance with the requirements of ASME Section III, Division 2, Subsection CC code, which is applied to the design of the containment liner plate, because there is no applicable design code for the stainless steel liner plate used for the IRWST and the HVT. However, the SSLP material of the IRWST and the HVT will meet the only portion of the ASME Section III, Division 2, Subsection CC-2511 with exception of testing and quality assurance side although the material character is identical to that meets Subsection CC-2511.

Impact on DCD

DCD Tier 2, Table 6.1-2 and Section 3.8.3.6.3 will be revised, as shown in the Attachments 1 and 2, respectively.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

There is no impact on the Technical Specifications.

Impact on Technical/Topical/Environmental Reports

There is no impact on any Technical, Topical, or Environment Report.

APR1400 DCD TIER 2

AI 6-14_6.1.1_#10, #12

Table 6.1-2 (3 of 3)

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ESF Component	Material	Class, Grade, or Type
ESF Filter System		
Subsection 6.5.1		
In-Containment Water Storage System		
IRWST	A 240	Type 304
HVT	A 240	Type 304
IRWST Sump strainer	A 240	Type 304
Class 2 piping	SA-312	Gr. TP304
	SA-358	Gr. TP304
Class 2 valves	SA-182	Gr. F316
	SA-351	Gr. CF8M
Fitting / flange	SA-182	F304
	SA-193	Gr. B7
	SA-194	Gr. 2H
	SA-403	Gr. WP304
Weld Filler Material		
	SFA-5.1	E7016, E7018
	SFA-5.4	E308-15, E308-16, E308L-15, E308L-16 E309L-16
	SFA-5.5	E9018-B3
	SFA-5.9	ER308, ER309, ER308L, ER309L
	SFA-5.11	ENiCrFe-7
	SFA-5.14	ERNiCrFe-7, ERNiCrFe-7A
	SFA-5.18	ER70S-2, ER70S-6
	SFA-5.28	ER90S-B3

IRWST Liner

HVT Liner

Furnishing and fabrication of structural steel conform with all applicable requirements of AISC N690. Certified mill test reports for structural steel are submitted for review.

3.8.3.6.3 Stainless Steel Pool Liners

This material quality is ensured in accordance with 10 CFR 50 Appendix B and ASME NQA-1.

Stainless steel pool liners are fabricated from ASTM A240 Type 304 material, hot rolled, annealed and pickled and further processed by cold rolling.

including IRWST liners and HVT liners

Welding procedures are in accordance with ASME Section III, Division 2, Subarticle CC-4540 and ASME Section IX. All seam welds are full-penetration butt welds. The liner plate seam welds are examined and tested as follows:

- a. Liquid penetrant examination is performed on austenitic materials. The weld surfaces and at least 12.7 mm (1/2 in.) of the adjacent base material on each side of the weld are examined. The examination coverage is 100 percent of all shop and field seam welds.
- b. Vacuum leak test is performed for leak-tightness on all liner plate seam welds.

Stainless steel surfaces on the pool sides of the plate conform with the finish of No.4 as specified by ASTM A480.

3.8.3.6.4 Stainless Steel Other Than Pool Liners

Stainless steel embedded plates and stainless steel checkered floor plates are fabricated from A240 Type 304 material, hot rolled, annealed, and pickled. Stainless steel bars and rounds are fabricated from A276 or A479 Type 304 material, hot rolled, annealed, and pickled.

Stainless steel pipes are fabricated from A312 Type 304 or A358 Type 304 or A376 Type 304 materials, hot rolled, annealed, and pickled.

Stainless steel gratings are fabricated from A240 Type 302 or Type 304 materials, hot rolled, annealed, and pickled prior to fabrication and then electro-polished after fabrication.

Stainless steel sump liners are fabricated from A240 Type 304 or Type 316 materials.

Stainless steel bolts are fabricated from A193 Type 304 class 1 material.

Stainless steel nuts are fabricated from A194 Type 304 material.