
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.: 452-8545
SRP Section: 10.03.06 – Steam and Feedwater System Materials
Application Section: 10.3.6
Date of RAI Issue: 03/28/2016

Question No. 10.03.06-18

In RAI 314-8378, Question 28626 (10.03.06-10) the staff asked the following question:

2. Would a COL applicant using the APR1400 design have a FAC program that is consistent with the KHNP FAC program or the EPRI program without modifications?

In response to this RAI the applicant deleted the following phrase from Section 10.3.6.3:

“using knowledge acquired from experience in pipe wall thinning management of operating nuclear power plants in Korea.”

The staff believes that a COL licensee referencing the APR-1400 DCD would not be required to implement a FAC program be based upon the KHNP FAC program.

It would require a FAC program based upon an EPRI NSAC-202L and GL 89-08 program.

In RAI 314-8378, Question 28614 (Question 10.03.06-04) the applicant describes the differences between the KHNP FAC program and the EPRI NSAC-202L program. Based upon the staff understanding to Question 10.03.06-10 the staff believes that a COL licensee referencing the APR1400 FAC program would not be impacted by the differences between the KHNP and EPRI FAC program because a COL licensee would be required to use the EPRI FAC program.

The staff asks for confirmation: would the differences between the KHNP and EPRI FAC programs discussed in Question 10.03.06-04 apply to the an COL licensee that would reference the APR-1400 DCD?

Response

The differences between the KHNP and EPRI FAC programs would not apply to a COL licensee referencing the APR1400 DCD.

Impact on DCD

There is no impact on the DCD.

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 Environmental Report.

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Question No. 10.03.06-20

In response to RAI 314-8378, Question 28625 (Q 10.03.06-9) the applicant revised FSAR Tables 10.3.2-4. In response to RAI 314-8378 Questions 28613, 28615, and 28621 (10.03.06-3, 10.03.06-5, and 10.03.06-7) the applicant revised FSAR Tables 10.3.2-2 and 10.3.2-3.

The staff noted three changes there were beyond the scope of the RAI: 1) Removal of fittings, valves, and flanges from the table, 2) Changes to pipe sizes, and 3) changes to the millimeter nominal OD of piping.

The applicant needs to address these items:

- 1) Provide a justification for removing fittings, valves, and flanges removed from the table?
- 2) Provide an explanation for the changes in pipe sizes as a result of the cited RAIs. If the changes are intentional - update the P&IDs, transient analysis, and other impacted sections of the FSAR. If the changes were not intentional - update the Tables 10.3.2-3 and 10.3.2-4 with the correct information.

The following items were changed:

- Changing the "Main steam piping to MSSV" from 8 inches to 6 inches (Table 10.3.2-3)
- Changing the "Feedwater pump discharge header to Feedwater heaters 5/6/7" from 30 inches to 32 inches (Table 10.3.2-4 [1 of 2])
- Removing the 26 inch and 30 inch piping from the "Feedwater heaters 7 outlet header - Fittings" (Table 10.3.2-4 [1 of 2])
- Removing the 26 inch and 30 inch piping from the "Feedwater heaters 7 outlet header to MFVCs" (Table 10.3.2-4 [1 of 2])

- Removing the 26 inch and 30 inch piping from the "Feedwater heaters 7 outlet header to MFVCs - Fittings" (Table 10.3.2-4 [1 of 2])
- 3) The staff noted that the "Feedwater pump discharge header to Feedwater heaters 5/6/7" pipe diameter was changed from 660.44 (26) to 650(26). The staff reviewed tables 10.3.2-2, 10.3.2-3, and 10.3.2-4 and found that the applicant inconsistently and erroneously identifies pipe sizes.

Pipe sizing should be based upon ASME B36.10. In ASME B36.10 the NPS and outside diameter (inches) are the number same but, the DN and outside diameter (mm) are different numbers.

For a 24 NPS pipe: the outside diameter would be 24.000 inches, the DN would be 600, and the outside diameter would be 610 mm

For a 30 NPS pipe: the outside diameter would be 30.000 inches, the DN would be 750, and the outside diameter would be 762 mm

In table 10.3.2-4 (1 of 2) the first two entries confuse DN with outside diameter (mm):

Segment	Material Specification	Nominal OD (mm/in)	ASNE Class
Feedwater pump to feedwater pump discharge header	A-106 Gr.B (seamless)	600 (24)	B31.1
Feedwater pump discharge header	A-672 Gr.B60 (welded)	762 (30)	

The staff has seen this confusion in multiple parts of Tables 10.3.2-2, 10.3.2-3, and 10.3.2-4.

Revise Tables 10.3.2-2, 10.3.2-3, and 10.3.2-4 to consistently use either: NPS/DN or OD(inch)/OD(mm).

Response

DCD Tier 2, Tables 10.3.2-2, 10.3.2-3, and 10.3.2-4 will be revised.

Impact on DCD

DCD Tier 2, Table 10.3.2-2, 10.3.2-3, and 10.3.2-4 will be revised as indicated on the attached markup.

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 Environmental Report.

APR1400 DCD TIER 2

RAI 314-8378 Question 10.03.06-3

RAI 452-8545 Question 10.03.06-20

Table 10.3.2-2

Main Steam Piping Design Data

Segment	Material Specification	Nominal OD (mm (in))	ASME Class
SG to containment penetration	SA-106 Gr. C (seamless)	785.0 (30.907)	Section III, Class 2
Containment penetration to MSVH	SA-106 Gr. C (seamless)	785.0 (30.907) 820.7 (32.311)	Section III, Class 2
Fittings	SA-234 WPC	785.0 (30.907), 820.7 (32.311)	Section III, Class 2
Valves (gate)	SA-352 LCC	820.7 (32.311)	Section III, Class 2
MSVH to MS pipe enclosure	A-106 Gr. C (seamless)	802.8 (31.607)	B31.1
Fittings	A-234 WPC	Larger than 600 (24)	B31.1
MS pipe enclosure to main steam header	A-106 Gr. C (seamless)	802.8 (31.607)	B31.1
Main steam header	A-234 WPC	1517.7 (59.75)	
Main steam header to MSV	A-106 Gr. C (seamless)	732.8 (28.85)	
Fittings	A-234 WPC	Larger than 600 (24)	
Flanges	ASTM A-105	80 (3) and larger	
Valves (globe, gate, check)	ASTM A-105 or ASTM A-216 WCB	65 (2.5) ~ 650 (26)	

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Table 10.3.2-2

Main Steam Piping Design Data

Segment	Material Specification	Nominal OD (mm (in))	ASME Class
SG to containment penetration	SA-106 Gr.C (seamless)	785.0 (30.907)	Section III, Class 2
Containment penetration to MSVH	SA-106 Gr.C (seamless)	785.0 (30.907) 820.7 (32.311)	Section III, Class 2
Fittings	SA-234 WPC	785.0 (30.907) 785.0 (30.907)	Section III, Class 2
MSVH to MS pipe enclosure	A-106 Gr.C (seamless)	802.8 (31.607)	B31.1
Fittings	A-234 WPC	Larger than 600 (24)	B31.1
MS pipe enclosure to main stream header	A-106 Gr.C (seamless)	802.8 (31.607)	B31.1
Main steam header	A-672 Gr.B70 (welded)	1517.7 (59.75)	B31.1
Main steam header to MSV	A-106 Gr.C (seamless)	732.8 (28.85)	B31.1
Fitting	A-234 WPC	Larger than 600 (24)	B31.1

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Table 10. 3.2-2

A

Main Steam Piping Design Data

Segment	Material Specification	NPS	DN	Outside Diameter (in)	Remark	ASME Class
SG to containment penetration	SA-106 Gr.C (seamless)	N/A	N/A	30.907	Special Pipe	Section III, Class 2
Containment penetration to MSVH	SA-106 Gr.C (seamless)	N/A	N/A	30.907 32.311	Special Pipe	Section III, Class 2
Fittings	SA-234 WPC	N/A	N/A	30.907 32.311	Special Pipe	Section III, Class 2
MSVH to MS pipe enclosure	A-106 Gr.C (seamless)	N/A	N/A	31.607	Special Pipe	B31.1
Fittings	A-234 WPC	24	600	Larger than 24.000	-	B31.1
MS pipe enclosure to main steam header	A-106 Gr.C (seamless)	N/A	N/A	31.607	Special Pipe	B31.1
Main steam header	A-672 Gr.B70 (welded)	N/A	N/A	59.75	Special Pipe	B31.1
Main steam header to MSV	A-106 Gr.C (seamless)	N/A	N/A	28.85	Special Pipe	B31.1
Fittings	A-234 WPC	24	600	Larger than 24.000	-	B31.1

APR1400 DCD TIER 2

RAI 314-8378_Question 10.03.06-3
 RAI 314-8378_Question 10.03.06-5
 RAI 314-8378_Question 10.03.06-7

RAI 452-8545 Question 10.03.06-20

Table 10.3.2-3

Main Steam Branch Piping Design Data (2.5 Inches and Larger)

Segment	Material Specification	Nominal OD (mm (in))	ASME Class
Main steam piping to MSADV	SA106 Gr. C (seamless)	500 (20)	Section III, Class 2
MSADV discharge piping to silencer	A106 Gr. B (seamless)	400 (16)	B31.1
Main steam piping to MSSV	SA-105	200 (8)	Section III, Class 2
MSSV discharge piping to vent stack	A106 Gr. B (seamless)	250 (10), 650 (26)	B31.1
Main steam piping to pipe chase	SA-333 Gr. 6 (seamless)	200 (8)	Section III, Class 2
Pipe chase to AF pump turbine steam isolation valve	SA-106 Gr. B (seamless)	200 (8)	Section III, Class 3
Fittings	ASTM (S)A-234 WPB	65 (2.5) and larger	Section III, Class 2
Flanges	SA-350 LF2, ASTM A-105	65 (2.5) ~ 600 (24)	Section III, Class 2
Valves (globe, gate, check)	ASTM (S)A-216, WCB or WCC, A352 LCB	65 (2.5) and larger	Section III, Class 2
Main steam piping to moisture separator reheater	A106 Gr. B (seamless)	250 (10), 300 (12)	B31.1
Fittings	ASTM A-234, WPB	250 (10), 300 (12)	
Flanges	ASTM A-105	80 (3) and larger	
Valves (globe, gate, check)	ASTM A-216, WCB or WCC	65 (2.5) ~ 650 (26)	
HP turbine to moisture separator reheater	A588 Gr. C (welded)	1,050 (42)	B31.1
Moisture separator reheater to LP turbine	A588 Gr. C (welded)	1,050 (42)	B31.1
Fittings	ASTM A-234, WPB	1,050 (42)	

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RAI 314-8378_ Question 10.03.06-3
 RAI 314-8378_ Question 10.03.06-5
 RAI 314-8378_ Question 10.03.06-7

RAI 452-8545 Question 10.03.06-20

Table 10.3.2-3

Main Steam Branch Piping Design Data (2.5 Inches and Larger)

Segment	Material Specification	Nominal OD (mm (in))	ASME Class
Main steam piping to MSADV	SA-106 Gr.C (seamless)	500 (20)	Section III, Class 2
MSADB discharge piping to silencer	A-106 Gr.B (seamless)	400 (16)	B31.1
Main steam piping to MSSV	SA-105	150 (6)	Section III, Class 2
MSSV discharge piping to vent stack	A-106 Gr.B (seamless)	250 (10) 650 (26)	B31.1
Main steam piping to pipe chase	SA-333 Gr.6 (seamless)	200 (8)	Section III, Class 2
Pipe chase to AF pump turbine steam isolation valve	SA-106 Gr.B (seamless)	200 (8)	Section III, Class 2
Fittings	ASTM(S)A-234 WPB	65 (2.5) and larger	Section III, Class 2

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Table 10.3.2-3

B

Main Steam Branch Piping Design Data (2.5 Inches and Larger)

Segment	Material Specification	NPS	DN	Outside Diameter (in)	Remark	ASME Class
Main steam piping to MSADV	SA-106 Gr.C (seamless)	20	500	20.000	-	Section III, Class 2
MSADV discharge piping to silencer	A-106 Gr.B (seamless)	16	400	16.000	-	B31.1
Main steam piping to MSSV	SA-105	6	150	6.625	-	Section III, Class 2
MSSV discharge piping to vent stack	A-106 Gr.B (seamless)	10 26	250 650	10.750 26.000	-	B31.1
Main steam piping to pipe chase	SA-333 Gr.6 (seamless)	8	200	8.625	-	Section III, Class2
Pipe chase to AF pump turbine steam isolation valve	SA-106 Gr.B (seamless)	8	200	8.625	-	Section III, Class 2
Fittings	ASTM(S)A-234 WPB	2.5 and larger	65 and larger	2.875 and larger	-	Section III, Class 2

APR1400 DCD TIER 2

RAI 314-8378_ Question 10.03.06-3
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Table 10.3.2-4 (1 of 2)

Feedwater Piping Design Data

Segment	Material Specification	Nominal OD (mm (in))	ASME Class
Feedwater pump to feedwater pump discharge header	A-106 Gr. B (seamless)	600 (24)	B31.1
Feedwater pump discharge header	A-672 Gr. B60 (welded)	762 (30)	
Feedwater pump discharge header to feedwater heaters 5/6/7	A-672 Gr. B60 (welded)	660.4 (26), 762 (30)	
Feedwater heaters 7 to feedwater heaters 7 discharge header	A-672 Gr. B60 (welded)	660.4 (26)	
Feedwater heaters 7 discharge header	A-672 Gr. B60 (welded)	812.8 (32)	
Fittings	A-234 WPB	600 (24), 660.4 (26), 762 (30), 812.8 (32)	
Flanges	ASTM A-105	80 (3) and larger	
Valves (globe, gate, check)	ASTM A-105 or ASTM A-216 WCB or WCC	65 (2.5) ~ 660.4 (26)	B31.1
Feedwater heaters 7 discharge header to MFIV	A-106 Gr. B (seamless, welded)	250 (10), 660.4 (24), 762 (26), 812.8 (32)	
Fittings	A-234 WPB	250 (10), 660.4 (24), 762 (26), 812.8 (32)	
Flanges	ASTM A-105	80 (3) and larger	
Valves (globe, gate, check)	ASTM A-105 or ASTM A-216 WCB or WCC	65 (2.5) ~ 660.4 (26)	

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RAI 314-8378_Question 10.03.06-3
 RAI 314-8378_Question 10.03.06-9

RAI 452-8545 Question 10.03.06-20

Table 10.3.2-4 (1 of 2)

Feedwater Piping Design Data

Segment	Material Specification	Nominal OD (mm (in))	ASME Class
Feedwater pump to feedwater pump discharge header	A-106 Gr.B (seamless)	600 (24)	B31.1
Feedwater pump discharge header	A-672 Gr.B60 (welded)	762 (30)	B31.1
Feedwater pump discharge header to Feedwater heaters 5/6/7	A-672 Gr.B60 (welded)	650 (26) 812.8 (32)	B31.1
Feedwater heaters 7 to Feedwater heaters 7 outlet header	A-672 Gr.B60 (welded)	650 (26)	B31.1
Feedwater heaters 7 outlet header	A-672 Gr.B60 (welded)	812.8 (32)	B31.1
Fittings	A-234 WPB	600 (24)	B31.1
	A-234 WPC	812.8 (32)	
Feedwater heaters 7 outlet header to MFCVs	A-106 Gr.B (seamless, welded)	250 (10)	B31.1
		600 (24)	
Fittings	A-234 WPB	250 (10)	B31.1
		600 (24)	

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Table 10.3.2-4 (1 of 2)

C

Feedwater Piping Design Data

Segment	Material Specification	NPS	DN	Outside Diameter (in)	Remark	ASME Class
Feedwater pump to feedwater pump discharge header	A-106 Gr.B (seamless)	24	600	24.000	-	B31.1
Feedwater pump discharge header	A-672 Gr.B60 (welded)	30	750	30.000	-	B31.1
Feedwater pump discharge header to Feedwater heaters 5/6/7	A-672 Gr.B60 (welded)	26 32	650 800	26.000 32.000	-	B31.1
Feedwater heaters 7 to Feedwater heaters 7 outlet header	A-672 Gr.B60 (welded)	26	650	26.000	-	B31.1
Feedwater heaters 7 outlet header	A-672 Gr.B60 (welded)	32	800	32.000	-	B31.1
Fittings	A-234 WPB A-234 WPC	24 32	600 800	24.000 32.000	-	B31.1
Feedwater heaters 7 outlet header to MFCVs	A-106 Gr.B (seamless, welded)	10 24	250 600	10.750 24.000	-	B31.1
Fittings	A-234 WPB	10 24	250 600	10.750 24.000		B31.1

APR1400 DCD TIER 2

RAI 314-8378_Question 10.03.06-3

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Table 10.3.2-4 (2 of 2)

Segment	Material Specification	Nominal OD (mm (in))	ASME Class
Downcomer feedwater control valve to main steam valve house (MSVH)	A335 Gr. P22 (seamless)	250 (10)	B31.1
Fittings	A-234 WP22	250 (10)	
Flanges	ASTM A-182 Gr. F22	-	
Valves (globe, gate, check)	ASTM A-182 Gr. F22 or ASTM A-217 Gr. WC9	-	
MFIV to SG	SA-335 Gr. P22 (seamless)	150 (6), 250 (10), 350 (14), 600 (24)	Section III, Class 2
Fittings	SA-420 WPL6, SA-234 WP22	150 (6), 250 (10), 350 (14), 600 (24)	
Flanges	SA-350 LF2, SA-182 F22	150 (6) ~ 600 (24)	
Valves (globe, gate, check)	SA-182 F22 or SA-217 WC9, SA-350 LF2	150 (6) ~ 600 (24)	

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RAI 314-8378_ Question 10.03.06-3
 RAI 314-8378_ Question 10.03.06-9

RAI 452-8545 Question 10.03.06-20

Table 10.3.2-4 (2 of 2)

Segment	Material Specification	Nominal OD (mm (in))	ASME Class
Downcomer MFCV to main steam valve house (MSVH)	A-335 Gr.P22 (seamless)	250 (10)	B31.1
Fittings	A-234 WP22	250 (10)	B31.1
MSVH to MFIV	SA-333 Gr.6 (seamless)	250 (10) 600 (24)	Section III, Class 2
MFIV to SG	SA-335 Gr. P22 (seamless)	150 (6) 250 (10) 350 (14) 600 (24)	Section III, Class 2
Fittings	SA-234 WP22	150 (6) 250 (10) 350 (14) 600 (24)	Section III, Class 2

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Table 10.3.2-4 (2 of 2)

Segment	Material Specification	NPS	DN	Outside Diameter (in)	Remark	ASME Class
Downcomer MFCV to main steam valve house (MSVH)	A-335 Gr.P22 (seamless)	10	250	10.750	-	B31.1
Fittings	A-234 WP22	10	250	10.750	-	B31.1
MSVH to MFIV	SA-333 Gr.6 (seamless)	10	250	10.750	-	Section III, Class 2
		24	600	24.000		
MFIV to SG	SA-335 Gr. P22 (seamless)	6	150	6.625	-	Section III, Class 2
		10	250	10.750		
		14	350	14.000		
		24	600	24.000		
Fittings	SA-234 WP22	6	150	6.625	-	Section III, Class 2
		10	250	10.750		
		14	350	14.000		
		24	600	24.000		