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MFN 08-193

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**Subject:** **Response to Portion of NRC Request for Additional Information Letter No. 100 Related to ESBWR Design Certification Application - Containment Systems - RAI Number 6.2-157**

Enclosure 1 contains the GE Hitachi Nuclear Energy (GEH) response to the subject NRC RAI transmitted via the Reference 1 letter.

If you have any questions or require additional information, please contact me.

Sincerely,

R. E. Brown for

James C. Kinsey
Vice President, ESBWR Licensing

D068
NRO

Reference:

1. MFN 07-327, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, *Request for Additional Information Letter No. 100 Related to ESBWR Design Certification Application*, May 30, 2007

Enclosure:

1. MFN 08-193 - Response to Portion of NRC Request for Additional Information Letter No. 100 Related to ESBWR Design Certification Application - Containment Systems - RAI Number 6.2-157

cc:

| | |
|---|---|
| AE Cubbage | USNRC (with enclosures) |
| DH Hinds | GEH/Wilmington (with enclosures) |
| GB Stramback | GEH/San Jose (with enclosures) |
| RE Brown | GEH/Wilmington (with enclosures) |
| eDRF | 0000-0076-8748 |

# Enclosure 1

# MFN 08-193

# Response to Portion of NRC Request for Additional Information Letter No. 100 Related to ESBWR Design Certification Application

## Containment Systems

## RAI Number 6.2-157

**NRC RAI 6.2-157:**

*DCD, Tier 2, Revision 3, contains a new table, Table 6.2-47, "Containment Penetrations Subject to Type A, B, and C Testing." The staff compared this table with Tables 6.2-15 through 6.2-42, which were to provide "pertinent data for the containment isolation valves" (DCD Tier 2, Revision 3, subsection 6.2.4.2), presumably in a comprehensive way. However, Table 6.2-47 includes many containment piping penetrations (approximately 122) which are not covered in Tables 6.2-15 through 6.2-42 or elsewhere in DCD Tier 2, Revision 3, section 6.2.4, "Containment Isolation Function." Further, Table 6.2-47 contains virtually no information on the containment isolation provisions for these lines, other than incomplete information on leakage rate testing.*

*Most of these penetrations are designated by numbers ending in "TBD," apparently meaning "To Be Determined." Many of the lines are instrument lines and many are part of systems whose larger lines are addressed in Tables 6.2-15 through 6.2-42. However, some are systems which are not covered at all in Tables 6.2-15 through 6.2-42:*

*Control Rod Drive System*

*Gravity Driven Cooling System*

*Makeup Water System*

*Service Air System*

*Containment Monitoring System*

*Equipment and Floor Drain System*

A. *Is the design of the containment isolation provisions for the approximately 122 penetrations to be performed by COL applicants? If so, provide a COL Item in DCD subsection 6.2.8. If not, provide the missing information in the DCD. Also, are there any other containment penetrations which are not listed in Table 6.2-47?*

B. *Table 6.2-47 also lists the containment air locks and hatches, which are not addressed elsewhere in section 6.2.4. Provide in the DCD containment isolation design information for the containment air locks and hatches.*

**GEH Response:**

A. The design of the containment isolation provisions is the responsibility of GEH not the COL applicants. With regard to the missing information in the DCD:

- The containment isolation provisions for instrument lines are discussed in DCD Tier 2, Revision 4, Subsection 6.2.4.2.2. Therefore, these provisions are not included in DCD Tier 2, Table 6.2-47 or DCD Tier 2, Tables 6.2-15 through 6.2-42 as discussed in the response to RAI 6.2-110 S01 (MFN 06-461, Supplement 6, dated December 3, 2007).
- Electrical penetrations and air locks/hatches are listed in DCD Tier 2, Table 6.2-47 but not in DCD Tier 2, Tables 6.2-15 through 6.2-42, because they do not have isolation valves.

- There are twelve containment penetrations listed in DCD Tier 2, Table 6.2-47 for Fine Motion Control Rod Drive System (FMCRD). These lines are continuously pressurized. Therefore, no containment isolation valves need to be listed in DCD Tier 2, Tables 6.2-15 through 6.2-42.
- As discussed in the response to RAI 6.2-102 S01 (MFN 06-466, Supplement 1, dated August 17, 2007), the Passive Containment Cooling System (PCCS) is an integral part of containment. Therefore, there are no PCCS containment penetrations. DCD Tier 2, Table 6.2-47 is revised by the response to RAI 6.2-102 S01 to remove the PCCS containment penetrations. DCD Tier 1, Table 2.15.1-1 is also updated by this response.
- As discussed in the response to RAI 6.2-122 S01 (MFN 06-466, Supplement 3, dated December 10, 2007), containment penetration G21-MPEN-TBD (Reactor Well Drain Line) will be numbered G21-MPEN-0008, and will have redundant isolation valves. DCD Tier 2, Tables 6.2-35 and 6.2-47, and DCD Tier 1, Table 2.15.1-1, is updated accordingly by RAI 6.2-122 S01. In addition, these containment isolation valves are added to the Inservice Testing (IST) program (DCD Tier 2, Table 3.9-8) by the response to RAI 3.9-159 S01 (MFN 08-109, dated February 11, 2008).
- Penetration P10-MPEN-TBD (Makeup Water System) is numbered P10-MPEN-0001, and has redundant isolation valves – one manual valve and one check valve. DCD Tier 1, Table 2.15.1-1 will be updated to show these valves, and isolation valve information will be added in DCD Tier 2, Table 6.2-41. In addition, these containment isolation valves are added to the IST program (DCD Tier 2, Table 3.9-8) by the response to RAI 3.9-159 S01 (MFN 08-109, dated February 11, 2008).
- Penetration P51-MPEN-TBD (Breathing Air Supply) is deleted from DCD Tier 1, Table 2.15.1-1 and DCD Tier 2, Table 6.2-47. This system is no longer part of the ESBWR design.
- Penetration P51-MPEN-TBD (Service Air Supply) will be numbered –0001 and will have double containment isolation valves. These valves are added to DCD Tier 2, Table 6.2-44 and to the IST Program by the response to RAI 3.9-159 S01 (MFN 08-109, dated February 11, 2008).
- The three penetrations labeled T11-MPEN-TBD (Spare Mechanical Penetrations) are capped. DCD Tier 2, Table 6.2-47 is revised to indicate these lines are capped.
- Penetration T31-MPEN-TBD (Containment Pressure Test, GDCS Pool) is removed from DCD Tier 2, Table 6.2-47. This test line is no longer required.
- Penetration T31-MPEN-TBD (Containment Pressure Test, Lower Drywell) is isolated and capped. DCD Tier 2, Table 6.2-47 is revised to indicate these lines are capped.
- The eight System T62 penetrations (T62-MPEN-TBD, H2-O2 & Drywell Gas Sample Lines from Upper Drywell, Loops A/B, Wetwell Airspace, Loops A/B,

H2-O2 & Drywell Gas Sample Return Lines to Upper Drywell, Loops A/B, and Wetwell Airspace, Loops A/B) will have double containment isolation valves. These valves are added to DCD Tier 2, Table 6.2-45.

- Penetrations U50-MPEN-TBD (Drywell LCW Sump Discharge Line, two penetrations) will have double containment isolation valves. These valves are listed in DCD Tier 2, Revision 4, Table 3.9-8 and are added to DCD Tier 2, Table 6.2-43.

B. Containment air locks and hatches are discussed in DCD Tier 2, Revision 4, Subsections 3.8.2.1.1 and 3.8.2.1.2, respectively, including their sealing capabilities for containment isolation purposes. Shop testing requirements are discussed in DCD Tier 2, Revision 4, Subsection 3.8.2.7.2.

**DCD Impact:**

DCD Tier 1, Table 2.15.1-1, and DCD Tier 2, Subsection 6.2.4.2 and Tables 6.2-16 through 6.2-47, will be revised as shown in the attached markup.

Table 2.15.1-1

Containment System Penetrations and Equipment

| Equipment Name | ASME Code Section III | Seismic Cat. 1 | Remote Manual Operation | Safety-Related | Containment Isolation Signal | Normal Position | Post-Accident Position | Loss of Motive Power Position |
|---|---|---|---|---|---|---|---|---|
| Penetration Identification: B21-MPEN-0001 (0002, 0003, 0004) | | | | | | | | |
| Main Steam Line A (B, C, D)<br>• F001A (B, C, D) Inboard<br>• F002A (B, C, D) Outboard | Yes | Yes | Yes | ~~Yes~~<br>Yes | Yes | Open | Closed | Closed |
| • F016A (B, C, D) Outboard | Yes | Yes | Yes | Yes | Yes | Open | Closed | As-is |
| Penetration Identification: B21-MPEN-0005 | | | | | | | | |
| Main Steam Line Drains<br>• F010 Inboard<br>• F011 Outboard | Yes | Yes | Yes | ~~Yes~~<br>Yes | Yes | Open | Closed | Closed |
| Penetration Identification: B21-MPEN-0006 (0007) | | | | | | | | |
| Feedwater Line A (B)<br>• F102A (B) Inboard | Yes | Yes | N/A | Yes | Process Actuated | Open | N/A | N/A |
| • F101A (B) Outboard | Yes | Yes | Yes | Yes | Yes | Open | Closed | N/A |
| Penetration Identification: B32-MPEN-0001 (0002, 0003, 0004) | | | | | | | | |
| IC Steam Supply<br>• F001A (B, C, D) Inboard | Yes | Yes | Yes | Yes | Yes | Open | Open (Except on IC pipe or tube failure) | As-is |

**Table 2.15.1-1**

**Containment System Penetrations and Equipment**

| Equipment Name | ASME Code Section III | Seismic Cat. 1 | Remote Manual Operation | Safety-Related | Containment Isolation Signal | Normal Position | Post-Accident Position | Loss of Motive Power Position |
|---|---|---|---|---|---|---|---|---|
| • F002A (B, C, D) Inboard | Yes | Yes | Yes | Yes | Yes | Open | Open (two in series valves) | As-is |
| Penetration Identification: B32-MPEN-0005 (0006, 0007, 0008) | | | | | | | | |
| IC Condensate Return<br>• F003A (B, C, D) Inboard<br>• F004A (B, C, D) Inboard | Yes | Yes | Yes | ~~Yes~~<br>Yes | Yes | Open | Open (two in series valves) | As-is |
| Penetration Identification: B32-MPEN-0009 (0010, 0011, 0012) | | | | | | | | |
| IC System Upper Header Vent<br>• F007A (B, C, D) Inboard<br>• F008A (B, C, D) Inboard | Yes | Yes | Yes | ~~Yes~~<br>Yes | No | Closed | Closed | Closed |
| Penetration Identification: B32-MPEN-0013 (0014, 0015, 0016) | | | | | | | | |
| IC System Lower Header Vent<br>• F009A (B, C, D) Inboard<br>• F010A (B, C, D) Inboard<br>IC System Lower Header Bypass Vent<br>• F011A (B, C, D) Inboard<br>• F012A (B, C, D) Inboard | Yes | Yes | Yes | ~~Yes~~<br>~~Yes~~<br>~~Yes~~<br>Yes | No | Closed | Closed | Closed |
| Penetration Identification: B32-MPEN-0017 (0018, 0019, 0020) | | | | | | | | |
| IC System Purge Line<br>• F013A (B, C, D) Inboard | Yes | Yes | Yes | Yes | Yes | Open | Open | Closed |

Table 2.15.1-1

Containment System Penetrations and Equipment

| Equipment Name | ASME Code Section III | Seismic Cat. 1 | Remote Manual Operation | Safety-Related | Containment Isolation Signal | Normal Position | Post-Accident Position | Loss of Motive Power Position |
|---|---|---|---|---|---|---|---|---|
| IC System Excess Flow Purge<br>• F014A (B, C, D) Inboard | Yes | Yes | N/A | Yes | Process Actuated | Open | Open | As-is |
| Penetration Identification: G31-MPEN-0001 (0002) | | | | | | | | |
| RWCU/SDC system<br>• F002A (B) Inboard<br>• F003A (B) Outboard | Yes | Yes | Yes | ~~Yes~~<br>Yes | Yes | Open/~~Closed~~ | Closed | Closed |
| Penetration Identification: G31-MPEN-0003 (0004) | | | | | | | | |
| RWCU/SDC system<br>• F007A (B) Inboard<br>• F008A (B) Outboard | Yes | Yes | Yes | ~~Yes~~<br>Yes | Yes | Open/~~Closed~~ | Closed | Closed |
| Penetration Identification: G31-MPEN-0005 (0006) | | | | | | | | |
| RWCU/SDC system<br>• F038A (B) Inboard<br>• F039A (B) Outboard | Yes | Yes | Yes | ~~Yes~~<br>Yes | Yes | ~~Open/~~<br>Closed | Open/<br>Closed | Closed |
| Penetration Identification: C41-MPEN-0001 (0002) | | | | | | | | |
| Standby Liquid Control<br>• F005A (B) Inboard<br>• F004A (B) Outboard | Yes | Yes | N/A | ~~Yes~~<br>Yes | Process Actuated | Closed | Open/<br>Closed | N/A |
| • F003A (B) Outboard<br>• F003C (D) Outboard | Yes | Yes | N/A | ~~Yes~~<br>Yes | N/A | Closed | Open | ~~As-is~~N/A |

**Table 2.15.1-1**

**Containment System Penetrations and Equipment**

| Equipment Name | ASME Code Section III | Seismic Cat. 1 | Remote Manual Operation | Safety-Related | Containment Isolation Signal | Normal Position | Post-Accident Position | Loss of Motive Power Position |
|---|---|---|---|---|---|---|---|---|
| Penetration Identification: G21-MPEN-0005 | | | | | | | | |
| Fuel and Auxiliary Pools Cooling System<br>• F321A Outboard<br>• F322A Outboard | Yes | Yes | Yes | ~~Yes~~<br>Yes | N/A | Closed | Closed | As-is |
| Penetration Identification: G21-MPEN-0002 | | | | | | | | |
| Fuel and Auxiliary Pools Cooling System<br>• F306A Outboard | Yes | Yes | Yes | Yes | N/A | Closed | Closed | As-is |
| • F307A Inboard | Yes | Yes | N/A | Yes | Process Actuated | N/A | N/A | N/A |
| Penetration Identification: G21-MPEN-0007 | | | | | | | | |
| Fuel and Auxiliary Pools Cooling System<br>• F321B Outboard<br>• F322B Outboard | Yes | Yes | Yes | ~~Yes~~<br>Yes | N/A | Closed | Closed | As-is |
| Penetration Identification: G21-MPEN-0006 | | | | | | | | |
| Fuel and Auxiliary Pools Cooling System<br>• F306B Outboard | Yes | Yes | Yes | Yes | N/A | Closed | Closed | As-is |
| • F307B Inboard | Yes | Yes | N/A | Yes | N/A | N/A | N/A | N/A |

Table 2.15.1-1

Containment System Penetrations and Equipment

| Equipment Name | ASME Code Section III | Seismic Cat. 1 | Remote Manual Operation | Safety-Related | Containment Isolation Signal | Normal Position | Post-Accident Position | Loss of Motive Power Position |
|---|---|---|---|---|---|---|---|---|
| Penetration Identification: G21-MPEN-0004 | | | | | | | | |
| Fuel and Auxiliary Pools Cooling System<br>• F323 Inboard | Yes | Yes | Yes | Yes | Yes | Closed | Closed | Closed |
| • F324 Outboard | Yes | Yes | Yes | Yes | Yes | Closed | Closed | Closed |
| Penetration Identification: G21-MPEN-0003 | | | | | | | | |
| Fuel and Auxiliary Pools Cooling System<br>• F303 Outboard | Yes | Yes | Yes | Yes | N/A | Closed | Closed | Closed |
| • F304 Inboard | Yes | Yes | N/A | Yes | Process Actuated | N/A | N/A | N/A |
| Penetration Identification: G21-MPEN-0001 | | | | | | | | |
| Fuel and Auxiliary Pools Cooling System<br>• F309 Outboard | Yes | Yes | Yes | Yes | N/A | Closed | N/A | Closed |
| • F310 Inboard | Yes | Yes | N/A | Yes | Process Actuated | Closed | N/A | As-is |
| Penetration Identification: T31-MPEN-0004 | | | | | | | | |
| Containment Inerting System<br>• F012 Outboard<br>• F011 Outboard | Yes | Yes | Yes | ~~Yes~~<br>Yes | Yes | Closed | Closed | Closed |

Table 2.15.1-1

Containment System Penetrations and Equipment

| Equipment Name | ASME Code Section III | Seismic Cat. 1 | Remote Manual Operation | Safety-Related | Containment Isolation Signal | Normal Position | Post-Accident Position | Loss of Motive Power Position |
|---|---|---|---|---|---|---|---|---|
| Penetration Identification: T31-MPEN-0003 | | | | | | | | |
| Containment Inerting System<br>• F010 Outboard<br>• F011 Outboard<br>• F014 Outboard<br>• F015 Outboard | Yes | Yes | Yes | ~~Yes~~<br>~~Yes~~<br>~~Yes~~<br>Yes | Yes | Closed | Closed | Closed |
| Penetration Identification: T31-MPEN-0002 | | | | | | | | |
| Containment Inerting System<br>• F008 Outboard<br>• F007 Outboard | Yes | Yes | Yes | ~~Yes~~<br>Yes | Yes | Closed | Closed | Closed |
| • F024 Outboard<br>• F023 Outboard | Yes | Yes | Yes | ~~Yes~~<br>Yes | Yes | Open | Closed | Closed |
| Penetration Identification: T31-MPEN-0001 | | | | | | | | |
| Containment Inerting System<br>• F008 Outboard<br>• F009 Outboard | Yes | Yes | Yes | ~~Yes~~<br>Yes | Yes | Closed | Closed | Closed |
| • F025 Outboard<br>• F023 Outboard | Yes | Yes | Yes | ~~Yes~~<br>Yes | Yes | Open | Closed | Closed |

**Table 2.15.1-1**

**Containment System Penetrations and Equipment**

| Equipment Name | ASME Code Section III | Seismic Cat. 1 | Remote Manual Operation | Safety-Related | Containment Isolation Signal | Normal Position | Post-Accident Position | Loss of Motive Power Position |
|---|---|---|---|---|---|---|---|---|
| ~~Penetration Identification: T31-MPEN-0003 (0004)~~ | | | | | | | | |
| ~~Containment Inerting System~~<br>~~Main and Secondary Exhaust Line~~<br>~~F010~~<br>~~F011~~<br>~~F012~~<br>~~F014~~<br>• ~~F015~~ | ~~Yes~~ | ~~Yes~~ | ~~Yes~~ | ~~Yes~~ | ~~Yes~~ | ~~Closed~~ | ~~Closed~~ | ~~Closed~~ |
| Penetration Identification: P25-MPEN-0001 (0003) | | | | | | | | |
| Chilled Water System<br>• F023A (B) Outboard<br>• F024A (B) Inboard | Yes | Yes | Yes | ~~Yes~~<br>Yes | Yes | Open | Closed | Closed |
| Penetration Identification: P25-MPEN-0002 (0004) | | | | | | | | |
| Chilled Water System<br>• F025A (B) Inboard<br>• F026A (B) Outboard | Yes | Yes | Yes | ~~Yes~~<br>Yes | Yes | Open | Closed | Closed |
| Penetration Identification: P54-MPEN-0001 | | | | | | | | |
| High Pressure Nitrogen Gas Supply<br>• F0026 Outboard<br>~~F009 Outboard~~ | Yes | Yes | Yes | ~~Yes~~<br>Yes | Yes | Open | Closed | Closed |

**Table 2.15.1-1**

**Containment System Penetrations and Equipment**

| Equipment Name | ASME Code Section III | Seismic Cat. 1 | Remote Manual Operation | Safety-Related | Containment Isolation Signal | Normal Position | Post-Accident Position | Loss of Motive Power Position |
|---|---|---|---|---|---|---|---|---|
| • F027 Inboard<br>• ~~F010 Inboard~~ | Yes | Yes | N/A | ~~Yes~~<br>Yes | Process Actuated | Open/ Closed | Closed | Closed |
| Penetration Identification: P54-MPEN-0002 | | | | | | | | |
| High Pressure Nitrogen Gas Supply<br>• F009 Outboard | Yes | Yes | Yes | Yes | Yes | Open | Closed | Closed |
| • F010 Inboard | Yes | Yes | N/A | Yes | Process Actuated | Open/ Closed | Closed | Closed |
| Penetration Identification: D11-MPEN-0001 | | | | | | | | |
| Process Radiation Monitoring System<br>• F001 Outboard<br>• F002 Outboard | Yes | Yes | Yes | ~~Yes~~<br>Yes | Yes | Open | Closed | Closed |
| Penetration Identification: D11-MPEN-0002 | | | | | | | | |
| • F003 Outboard<br>• F004 Outboard | Yes | Yes | Yes | ~~Yes~~<br>Yes | Yes | Open | Closed | Closed |
| ~~Penetration Identification: T15-MPEN-0001 (0002, 0003, 0004, 0005, 0006 0007, 0008, 0009, 0010, 0011, 0012, 0013, 0014, 0015, 0016, 0017, 0018)~~ | | | | | | | | |
| ~~Passive Containment Cooling System<br>□ Steam Inlet Line A (B, C, D, E, F)<br>• Condenser Condensate + Vent Line A1, A2 (B1, B2, C1, C2, D1, D2, E1, E2, F1, F2)~~ | ~~Yes~~ | ~~Yes~~ | - | - | - | - | - | - |

Table 2.15.1-1

Containment System Penetrations and Equipment

| Equipment Name | ASME Code Section III | Seismic Cat. 1 | Remote Manual Operation | Safety-Related | Containment Isolation Signal | Normal Position | Post-Accident Position | Loss of Motive Power Position |
|---|---|---|---|---|---|---|---|---|
| Penetration Identification: T11-MPEN-TBD | | | | | | | | |
| • Temporary Services During Outages and Spare Penetrations | Yes | Yes | - | - | - | - | - | - |
| Penetration Identification: B21-MPEN-TBD, B32-MPEN-TBD, E50-MPEN-TBD, ~~T31-MPEN-TBD,~~ T62-MPEN-TBD | | | | | | | | |
| • Instrumentation and Monitoring | Yes | Yes | - | - | - | - | - | - |
| Penetration Identification: C~~21~~2-MPEN-TBD | | | | | | | | |
| • FMCRD Hydraulic Lines | Yes | Yes | - | - | - | - | - | - |
| Penetration Identification: G21-MPEN-TBD | | | | | | | | |
| • Reactor Well Drain Line | Yes | Yes | - | - | - | - | - | - |
| Penetration Identification: P10-MPEN-0001 | | | | | | | | |
| ~~□Demin~~ Makeup Water ~~Drywell Distribution~~System<br>• F016 Inboard<br>• F015 Outboard | Yes | Yes | -No | -Yes | -No | -Closed | -Closed | -N/A |
| Penetration Identification: P5~~1~~2-MPEN-~~TBD~~0001 | | | | | | | | |
| ~~□~~Service Air System~~/ Breathing Air Supply~~<br>• Inboard<br>• Outboard | Yes | Yes | -No | -Yes | -No | - | - | -N/A |

**Table 2.15.1-1**

**Containment System Penetrations and Equipment**

| Equipment Name | ASME Code Section III | Seismic Cat. 1 | Remote Manual Operation | Safety-Related | Containment Isolation Signal | Normal Position | Post-Accident Position | Loss of Motive Power Position |
|---|---|---|---|---|---|---|---|---|
| Penetration Identification: U50-MPEN-0001~~TBD~~ | | | | | | | | |
| Equipment and Floor Drain System<br>• Drywell LCW Sump Discharge Line {Inboard}<br>• Drywell LCW Sump Discharge Line {Outboard}<br>~~• Drywell HCW Sump Discharge Line {Inboard}~~<br>~~• Drywell HCW Sump Discharge Line {Outboard}~~ | Yes | Yes | {Yes} | Yes | {Yes} | {Closed} | {Closed} | {Closed} |
| Penetration Identification: U50-MPEN-0002 | | | | | | | | |
| Equipment and Floor Drain System<br>• Drywell HCW Sump Discharge Line {Inboard}<br>• Drywell HCW Sump Discharge Line {Outboard} | Yes | Yes | {Yes} | Yes | {Yes} | {Closed} | {Closed} | {Closed} |
| Penetration Identification: T62-MPEN-TBD | | | | | | | | |
| Containment Monitoring System<br>• Eight penetrations | Yes | Yes | Yes/No | Yes | Yes | Open | Open | Open |
| Penetration Identification: R31-EPEN-TBD | | | | | | | | |
| Electrical Penetrations | Yes | Yes | - | Yes | - | - | - | - |

**Table 2.15.1-1**

**Containment System Penetrations and Equipment**

| Equipment Name | ASME Code Section III | Seismic Cat. 1 | Remote Manual Operation | Safety-Related | Containment Isolation Signal | Normal Position | Post-Accident Position | Loss of Motive Power Position |
|---|---|---|---|---|---|---|---|---|
| Penetration Identification: T11-SPEN-TBD | | | | | | | | |
| • Lower Drywell Equipment Hatch<br>• Lower Drywell Personnel Airlock<br>• Wetwell Access Hatch<br>• Upper Drywell Equipment Hatch<br>• Upper Drywell Personnel Airlock | Yes | Yes | - | - | - | - | - | - |

*6.2.4.2 System Design*

The containment isolation function is accomplished by valves and control signals, required for the isolation of lines penetrating the containment. The RCPB influent lines are identified in Table 6.2-13, and the RCPB effluent lines are identified in Table 6.2-14. Tables 6.2-15 through 6.2-4~~2~~5 show the pertinent data for the containment isolation valves, except for excess flow check valves as discussed in Section 6.2.4.2.2. (Refer to COL item in section 6.2.8). A detailed discussion of the LD&IS controls associated with the containment isolation function is included in Subsection 7.3.3.

Power-operated containment isolation valves have position indicating switches in the control room to show whether the valve is open or closed. Power for valves used in series originates from physically independent sources without cross ties to assure that no single event can interrupt motive power to both closure devices.

All POVs with geared or bi-directional actuators (motorized or fluid-powered) remain in their last position upon failure of valve power. All POVs with fluid-operated/spring-return actuators (not applicable to air-testable check valves) close on loss of fluid pressure or power supply. To support the inerted containment design, pneumatic actuators for valves located inside containment are supplied with pressurized nitrogen gas, whereas pneumatic actuators for valves located outside of containment are generally supplied compressed air.

The design of the containment isolation function includes consideration for possible adverse effects of sudden isolation valve closure when the plant systems are functioning under normal operation.

General compliance or alternate approach assessment for Regulatory Guide 1.26 may be found in Subsection 3.2.2. General compliance or alternate approach assessment for Regulatory Guide 1.29 may be found in Subsection 3.2.1.

Containment isolation valves are generally automatically actuated by the various signals in primary actuation mode or are remote-manually operated in secondary actuation mode. Other appropriate actuation modes, such as process-actuated check valves, are identified in the containment isolation valve information Tables 6.2-13 through 6.2-4~~2~~5.

## Table 6.2-15

## Legend For Tables 6.2-16 through 6.2-453

(a) Termination Region of the leakage through packing/stem only for outboard valves:

- a1 = Reactor Building
- a2 = Main Steam Tunnel

(b) Termination Region outside containment of the leakage past seat:

- b1 = Pool open to reactor building
- b2 = External environment
- b3 = Main Condenser
- b4 = Isolation Condenser pool
- b5 = Reactor building
- b6 = Close loop outside containment
- b7 = Radwaste System

(c) ~~Value~~ Valve Operator Types[1]:

| | | |
|---|---|---|
| AO/Ac | = | Air-operated valve with accumulator |
| AO | = | Air-operated valve without accumulator |
| EX | = | Explosively-operated |
| M | = | Manually operated |
| NO/Acc | = | Nitrogen-operated valve with accumulator |
| NO | = | Nitrogen-operated valve without accumulator |
| NMO/Acc | = | Nitrogen-motor operated valve with accumulator |
| NMO | = | Nitrogen-motor operated valve without accumulator |
| MO | = | Motor-operated valve |
| SA | = | Self-actuated |
| SO | = | Solenoid-operated valve |
| ~~PM~~ | = | ~~Process medium operated valve~~ |

(d) Isolation Signal Codes:

- B Reactor vessel low water level - Level 2
- C Reactor vessel low water level - Level 1
- D Main steamline high flow rate
- E Turbine inlet low pressure
- F Main steamline tunnel high ambient temperature
- G Turbine area steamline high ambient temperature
- H High DW pressure
- I IC/PCC pool high radiation
- K IC lines high flow
- L Low main condenser vacuum
- M High flow in the RWCU/SDC loop

[1] The operator types listed embody certain functional characteristics, such as those that fail-safe vs. fail as-is, or those that have a stored energy source (spring, fluid accumulator) to permit completion of function or repeat performance of functions upon loss of normal power supply. The actuator type listed for any valve application is generally based on historical BWR design. Alternate valve-&-operator combinations that provide equivalent functional capability and performance are permissible.

N Standby Liquid Control System operating
P Remote manual
Q Process actuated
R Local manual (By Hand)
S LCW drain line high radiation ~~High radiation in DW sump line~~
T High HVAC radiation exhaust from refueling area or from Reactor Building.
U Feedwater lines differential flow
V HCW drain line radiation high

(e) Valve Types[2]:

OS&Y Outside stem and yoke, typical of gate and globe valve designs that have an externally exposed rising or non-rising stem that connects a yoke-mounted actuator (any type) to the internal disk assembly, and includes a stem sealing gland (with or without a hermetic disk-to-stem internal seal such as a metal bellows or diaphragm).

Gate (GT) Any of several styles of valve where the disk is formed as a plate which transits the fluid flow stream with an orthogonal motion. The seating surface of the valve body is also manufactured to be at a slight angle to or set orthogonal to the flow stream. The disk can be wedge-shaped in either solid or split/flexible form, or as two plates mounted back-to-back or similar form (e.g., parallel-slide or double-disk gate), matching the seat configuration. Additional variants include shutter type and rotating-slide type gate valves.

Globe (GB) Any of several styles and configurations of valves where the disk is formed either as a truncated cone or curved section (spherical, elliptical, parabolic, etc.) with or without a following structure to support and guide the disk-&-stem motion. The body seat is centered around the flow stream and the disk-&-stem motion axis is perpendicular to the seat (i.e., axially concentric with the flow stream at the seat orifice plane). Body variations are based on the angle of the inlet-to-outlet nozzles and/or the angle of the stem to the inlet or outlet nozzle. Stem and disk assembly may be unconnected to permit a combined check and stop valve function (floating-disk stop, non-return check, etc.).

Quarter-turn (QT) Any of various types of butterfly (QBF) and ball (QBL) valves where the stem/shaft is mounted across the flow stream and the pallet, ball or plug (disk) is rotated through a 90 degree arc from full-closed to full-open. The actuator mechanism is typically mounted directly to the valve bonnet and there may be no exposed stem. The butterfly valve pallet remains in the flow stream when the valve is open whereas the plug and ball valves provide either a reduced or full pipe diameter flow orifice and shield the valve and disk seating surfaces when opened.

Axial-flow (AF) A variant of globe valves with the valve bonnet and disk-stem assembly rotated to be completely internalized and concentric with the fluid flow axis through the valve. There may be no external exposed stem or sealing gland, depending on design function(s) and selected actuation option. Based on specific product design, the flow path is

[2] Valve type(s) listed for each containment isolation valve number in Tables 6.2-16 through 6.2-42 indicates either the specific design characteristics of a type or the range of types with suitable equivalent design characteristics capable of performing the intended function(s) for each application. The first type listed is generally based on historical selection from previous BWR designs.

typically formed as either an annular nozzle in a wafer-style body or as annular venturi in a teardrop-style body.

Check (CK) A valve operated by process flow (opens on forward flow, closes on reverse flow and gravity) with a pallet style disk that is connected by a hinge bracket or arm to a shaft (or hinge end pins). The shaft is aligned in the horizontal plane with its rotation center typically set above the main fluid flow path so that the pallet swings up and out of the main flow on valve opening. A variant is the tilting disk pattern wherein the shaft is set closer to flow center and the hinge point is mounted directly behind the pallet (similar to a butterfly valve). Check valves may have spring-return closure (closure-assist) either internally or externally mounted. Globe and axial-flow valve variants are also designed to perform the check valve function.

Relief (RV) A variant of globe valves operated by process pressure most commonly built in spring-closed pressure-under-seat/pressurize-to-lift pattern (also referred to as direct-acting). There are also piloted relief valve versions, using a piston and process pressure to move the main disk off its seat, that are either depressurize-to-operate or pressurize-to-operate designs. The control pilot that operates the piston is typically a small version of direct-acting pressure relief valve.

Squib (SQ) A valve actuated by an explosively-operated (EX) actuator. Typically, a squib valve is normally closed and may be opened by shearing the disk off the body seat.

**Table 6.2-16**

**Containment Isolation Valve Information for the Nuclear Boiler System**

**Main Steam Line A**

| **Penetration Identification** | B21-MPEN-0001 | | |
|---|---|---|---|
| Valve No. | F001A | F002A | F016A |
| Applicable Basis | GDC 55 | GDC 55 | GDC 55 |
| Tier 2 Figure | 5.1-2 | 5.1-2 | 5.1-2 |
| ESF | No | No | No |
| Fluid | Steam | Steam | Steam/Water |
| Line Size | 700 mm | 700 mm. | 50 mm. |
| Type C Leakage Test | Yes | Yes | Yes |
| Pipe Length from Cont. to Inboard/Outboard Isolation Valve | COL holder to provide | COL holder to provide | COL holder to provide |
| Leakage Through Packing[a] | N/A | ($a_2$) | ($a_2$) |
| Leakage Past Seat[b] | ($b_3$) | ($b_3$) | ($b_3$) |
| Location | Inboard | Outboard | Outboard |
| Valve Type[e] | ~~GB, GT, AF, QT~~ | ~~GB, GT, AF, QT~~ | GT, ~~GB,~~ QBL |
| Operator[c] | NO/Acc | AO/Acc | NMO |
| Normal Position | Open | Open | Open |
| Shutdown Position | Closed | Closed | Open |
| Post-Acc Position | Closed | Closed | Open/Closed |
| Power Fail Position | Closed | Closed | ~~As is~~Closed |
| Cont. Iso. Signal[d] | B,C,D,E,F,G,L | B,C,D,E,F,G,L | B,C,D,E,F,G,L |
| Primary Actuation | Automatic | Automatic | Automatic |
| Secondary Actuation | Remote manual | Remote manual | Remote manual |
| Closure Time (sec) | 3.0-5.0 | 3.0-5.0 | 15 |
| Power Source | Div. 1, 2 | Div. 1, 2 | Div. 1, 2, 3 |

Note: For explanation of codes, see legend in Table 6.2-15.

**Table 6.2-17**

**Containment Isolation Valve Information for the Nuclear Boiler System**

**Main Steam Line B**

| **Penetration Identification** | B21-MPEN-0002 | | |
|---|---|---|---|
| Valve No. | F001B | F002B | F016B |
| Applicable Basis | GDC 55 | GDC 55 | GDC 55 |
| Tier 2 Figure | 5.1-2 | 5.1-2 | 5.1-2 |
| ESF | No | No | No |
| Fluid | Steam | Steam | Steam/Water |
| Line Size | 700 mm | 700 mm | 50 mm |
| Type C Leakage Test | Yes | Yes | Yes |
| Pipe Length from Cont. to Inboard/Outboard Isolation Valve | COL holder to provide | COL holder to provide | COL holder to provide |
| Leakage Through Packing[a] | N/A | ($a_2$) | ($a_2$) |
| Leakage Past Seat[b] | ($b_3$) | ($b_3$) | ($b_3$) |
| Location | Inboard | Outboard | Outboard |
| Valve Type[e] | ~~GB, GT, AF, QT~~ | ~~GB, GT, AF, QT~~ | GT, ~~GB,~~ QBL |
| Operator[c] | NO/Acc | AO/Acc | ~~N~~MO |
| Normal Position | Open | Open | Open |
| Shutdown Position | Closed | Closed | Open |
| Post-Acc Position | Closed | Closed | Open/Closed |
| Pwr Fail Position | Closed | Closed | ~~As is~~Closed |
| Cont. Iso. Signal[d] | B,C,D,E,F,G,L | B,C,D,E, F,G,L | B,C,D,E,F,G,L |
| Primary Actuation | Automatic | Automatic | Automatic |
| Secondary Actuation | Remote manual | Remote manual | Remote manual |
| Closure Time (sec) | 3.0-5.0 | 3.0-5.0 | 15 |
| Power Source | Div. 1, 2 | Div. 1, 2 | Div. 1, 2, 3 |

Note: For explanation of codes, see legend in Table 6.2-15.

**Table 6.2-18**

**Containment Isolation Valve Information for the Nuclear Boiler System**

**Main Steam Line C**

| Penetration Identification | B21-MPEN-0003 | | |
|---|---|---|---|
| Valve No. | F001C | F002C | F016C |
| Applicable Basis | GDC 55 | GDC 55 | GDC 55 |
| Tier 2 Figure | 5.1-2 | 5.1-2 | 5.1-2 |
| ESF | No | No | No |
| Fluid | Steam | Steam | Steam/Water |
| Line Size | 700 mm | 700 mm | 50 mm |
| Type C Leakage Test | Yes | Yes | Yes |
| Pipe Length from cont. to Inboard/Outboard Isolation Valve | COL holder to provide | COL holder to provide | COL holder to provide |
| Leakage Through Packing[a] | N/A | ($a_2$) | ($a_2$) |
| Leakage Past Seat[b] | ($b_3$) | ($b_3$) | ($b_3$) |
| Location | Inboard | Outboard | Outboard |
| Valve Type[e] | ~~GB, GT, AF, QT~~ | ~~GB, GT, AF, QT~~ | GT, ~~GB,~~ GBL |
| Operator[c] | NO/Acc | AO/Acc | NMO |
| Normal Position | Open | Open | Open |
| Shutdown Position | Closed | Closed | Open |
| Post-Acc Position | Closed | Closed | Open/Closed |
| Power Fail Position | Closed | Closed | ~~As is~~Closed |
| Cont. Iso. Signal[d] | B,C,D,E,F,G,L | B,C,D,E,F,G,L | B,C,D,E,F,G,L |
| Primary Actuation | Automatic | Automatic | Automatic |
| Secondary Actuation | Remote manual | Remote manual | Remote manual |
| Closure Time (sec) | 3.0-5.0 | 3.0-5.0 | 15 |
| Power Source | Div. 1, 2 | Div. 1, 2 | Div. 1, 2, 3 |

Note: For explanation of codes, see legend in Table 6.2-15.

**Table 6.2-19**

**Containment Isolation Valve Information for the Nuclear Boiler System**

**Main Steam Line D**

| **Penetration Identification** | B21-MPEN-0004 | | |
|---|---|---|---|
| Valve No. | F001D | F002D | F016D |
| Applicable Basis | GDC 55 | GDC 55 | GDC 55 |
| Tier 2 Figure | 5.1-2 | 5.1-2 | 5.1-2 |
| ESF | No | No | No |
| Fluid | Steam | Steam | Steam/Water |
| Line Size | 700 mm | 700 mm | 50 mm |
| Type C Leakage Test | Yes | Yes | Yes |
| Pipe Length from cont. to Inboard/Outboard Isolation Valve | COL holder to provide | COL holder to provide | COL holder to provide |
| Leakage Through Packing[a] | N/A | ($a_2$) | ($a_2$) |
| Leakage Past Seat[b] | ($b_3$) | ($b_3$) | ($b_3$) |
| Location | Inboard | Outboard | Outboard |
| Valve Type[e] | ~~GB, GT, AF, QT~~ | ~~GB, GT, AF, QT~~ | GT, ~~GB,~~ QBL |
| Operator[c] | NO/Acc | AO/Acc | ~~N~~MO |
| Normal Position | Open | Open | Open |
| Shutdown Position | Closed | Closed | Open |
| Post-Acc Position | Closed | Closed | Open/Closed |
| Power Fail Position | Closed | Closed | ~~As is~~Closed |
| Cont. Iso. Signal[d] | B,C,D,E,F,G,L | B,C,D,E,F,G,L | B,C,D,E,F,G,L |
| Primary Actuation | Automatic | Automatic | Automatic |
| Secondary Actuation | Remote manual | Remote manual | Remote manual |
| Closure Time (sec) | 3.0-5.0 | 3.0-5.0 | 15 |
| Power Source | Div. 1, 2 | Div. 1, 2 | Div. 1, 2, 3 |

Note: For explanation of codes, see legend in Table 6.2-15.

**Table 6.2-20**

**Containment Isolation Valve Information**

**for the Nuclear Boiler System Main Steam Line Drains**

| **Penetration Identification** | **B21-MPEN-0005** | |
|---|---|---|
| Valve No. | F010 | F011 |
| Applicable Basis | GDC 55 | GDC 55 |
| Tier 2 Figure | 5.1-2 | 5.1-2 |
| ESF | No | No |
| Fluid | Steam/water | Steam/water |
| Line Size | 80 mm | 80 mm |
| Type C Leakage Test | Yes | Yes |
| Pipe Length from cont. to Inboard/Outboard Isolation Valve | COL holder to provide | COL holder to provide |
| Leakage Through Packing[a] | N/A | ($a_2$) |
| Leakage Past Seat[b] | ($b_3$) | ($b_3$) |
| Location | Inboard | Outboard |
| Valve Type[e] | QBL, GT~~, QBL, GB~~ | GT, QBL~~, GB~~ |
| Operator[c] | NO | AO |
| Normal Position | Open | Open |
| Shutdown Position | Open | Open |
| Post-Acc Position | Closed | Closed |
| Power Fail Position | Closed | Closed |
| Cont. Iso. Signal[d] | B,C,D,E,F,G,L | B,C,D,E,F,G,L |
| Primary Actuation | Automatic | Automatic |
| Secondary Actuation | Remote manual | Remote manual |
| Closure Time (sec) | 15 | 15 |
| Power Source | Div. 2, 4 | Div. 1, 3 |

Note: For explanation of codes, see legend in Table 6.2-15.

**Table 6.2-21**

**Containment Isolation Valve Information for the Nuclear Boiler System**

**Feedwater Line A**

| **Penetration Identification** | **B21-MPEN-0006** | |
|---|---|---|
| Valve No. | F102A | F101A |
| Applicable Basis | GDC 55 | GDC 55 |
| Tier 2 Figure | 5.1-2 | 5.1-2 |
| ESF | No | No |
| Fluid | Water | Water |
| Line Size | 550 mm | 550 mm |
| Type C Leakage Test | Yes | Yes |
| Pipe Length from Cont. to Inboard/Outboard Isolation Valve | COL holder to provide | COL holder to provide |
| Leakage Through Packing[a] | N/A | ($a_2$) |
| Leakage Past Seat[b] | N/A | ($b_3$) |
| Location | Inboard | Outboard |
| Valve Type[e] | CK, ~~AF, GB~~ | ~~GB, AF~~CK |
| Operator[c] | SA ~~N/A~~ | ~~AO, PM~~/SA |
| Normal Position | Open | Open |
| Shutdown Position | ~~N/A~~Open/Closed | Closed |
| Post-Acc Position | ~~N/A~~Open/Closed | Open/Closed |
| Power Fail Position | ~~N/A~~Closed | ~~N/A~~Closed |
| Cont. Iso. Signal[d] | Q | Q, or U, B+H |
| Primary Actuation | Flow to open/close | Flow to open/close, or Auto-closed |
| Secondary Actuation | N/A | Remote manual |
| Closure Time (sec) | N/A | N/A on reverse-flow, < 410 sec on auto-isolation |
| Power Source | N/A | Div. 1, 3 |

Note: For explanation of codes, see legend on Table 6.2-15.

**Table 6.2-22**

**Containment Isolation Valve Information for the Nuclear Boiler System**

**Feedwater Line B**

| Penetration Identification | B21-MPEN-0007 | |
|---|---|---|
| Valve No. | F102B | F101B |
| Applicable Basis | GDC 55 | GDC 55 |
| Tier 2 Figure | 5.1-2 | 5.1-2 |
| ESF | No | No |
| Fluid | Water | Water |
| Line Size | 550 mm | 550 mm |
| Type C Leakage Test | Yes | Yes |
| Pipe Length from Cont. to Inboard/Outboard Isolation Valve | COL holder to provide | COL holder to provide |
| Leakage Through Packing[a] | N/A | ($a_2$) |
| Leakage Past Seat[b] | N/A | ($b_3$) |
| Location | Inboard | Outboard |
| Valve Type[e] | CK~~, AF, GB~~ | ~~GB, AF~~CK |
| Operator[c] | ~~N/A~~SA | ~~AO, PM~~/SA |
| Normal Position | Open | Open |
| Shutdown Position | ~~N/A~~Open/Closed | Closed |
| Post-Acc Position | ~~N/A~~Open/Closed | Open/Closed |
| Power Fail Position | ~~N/A~~Closed | ~~N/A~~Closed |
| Cont. Iso. Signal[d] | Q | Q, or U, B+H |
| Primary Actuation | Flow to open/close | Flow to open/close, or Auto-closed |
| Secondary Actuation | N/A | Remote manual |
| Closure Time (sec) | N/A | N/A on reverse flow, < 410 sec on auto-isolation |
| Power Source | N/A | Div. 1, 3 |

Note: For explanation of codes, see legend on Table 6.2-15.

**Table 6.2-23**

**Containment Isolation Valve Information for the Isolation Condenser System Loop A**

| Penetration Identification | B32-MPEN-0001[3] | | B32-MPEN-0005 | |
|---|---|---|---|---|
| Valve Number | F001A | F002A | F003A | F004A |
| Valve Location | Steam Supply | Steam Supply | Condensate Return | Condensate Return |
| Applicable Basis | GDC 55* | GDC 55* | GDC 55* | GDC 55* |
| Tier 2 Figure | 5.1-3 | 5.1-3 | 5.1-3 | 5.1-3 |
| ESF | Yes | Yes | Yes | Yes |
| Fluid | Steam | Steam | Condensate | Condensate |
| Line Size | 350mm | 350mm | 200mm | 200mm |
| Type C Leakage Test | Yes | Yes | Yes | Yes |
| Pipe Length from Cont. to Inboard/Outboard Isolation Valve | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide |
| Leakage Through Packing[a] | N/A | N/A | N/A | N/A |
| Leakage Past Seat[b] | [4] b6 | b6 | b6 | b6 |
| Location | Inboard | Inboard | Inboard | Inboard |
| Valve Type[e] | QBL, GT | QBL, GT | QBL, GT | QBL, GT |
| Operator[c] | NMO/Acc | NO/Acc | NO/Acc | NMO/Acc |
| Normal Position | Open | Open | Open | Open |
| Shutdown Position | Open | Open | Open | Open |
| Post-Acc Position | Open[5] | Open[5] | Open[5] | Open[5] |
| Power Fail Position | As is | As is | As is | As is |
| Cont. Iso. Signal[d] | I,K | I,K | I,K | I,K |
| Primary Actuation | Automatic | Automatic | Automatic | Automatic |
| Secondary Actuation | Remote manual | Remote manual | Remote manual | Remote manual |
| Closure Time (sec) | < 60 | < 60 | < 35 | < 35 |

[3] ~~Two in series valves~~
[4] Piping of IC Quality Group B Design
[5] Except on IC pipe or tube failure

**Table 6.2-23**

**Containment Isolation Valve Information for the Isolation Condenser System Loop A**

| Penetration Identification | B32-MPEN-0001[3] | | B32-MPEN-0005 | |
|---|---|---|---|---|
| Valve Number | F001A | F002A | F003A | F004A |
| Power Source | Div. 1, 3 | Div. 2, 4 | Div. 2, 4 | Div. 1, 3 |

* With respect to meeting the requirements of US NRC 10 CFR 50, Appendix A, General Design Criteria 55, the closed loop safety-related IC loop outside the containment is a "passive" substitute for an open "active" valve outside the containment. The combination of an already closed loop outside the containment plus the two series automatic isolation valves inside the containment comply with the requirement of the isolation guidelines of 10 CFR50, App.A, Criterion 55 and 56.

Note: For explanation of codes, see legend on Table 6.2-15.

## Table 6.2-24

## Containment Isolation Valve Information for the Isolation Condenser System Loop A

| Penetration Identification | B32-MPEN-0009[6] | | B32-MPEN-0013[7] | | | | B32-MPEN-0017[4] | |
|---|---|---|---|---|---|---|---|---|
| Valve Number | F007A | F008A | F009A | F010A | F011A | F012A | F013A | F014A |
| Valve Location | Upper Header Vent | Upper Header Vent | Lower Header Vent | Lower Header Vent | Lower Header Bypass Vent | Lower Header Bypass Vent | Purge line | Excess Flow Purge |
| Applicable Basis | GDC 55* | GDC 55* | GDC 55* | GDC 55* | GDC 55* | GDC 55* | GDC 55* | GDC 55* |
| Tier 2 Figure | 5.1-3 | 5.1-3 | 5.1-3 | 5.1-3 | 5.1-3 | 5.1-3 | 5.1-3 | 5.1-3 |
| ESF | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Fluid | Cond/Steam /Non Cond Gases | Cond/Steam /Non Cond Gases | Cond/Steam /Non Cond Gases | Cond/Steam /Non Cond Gases | Cond/Steam /Non Cond Gases | Cond/steam /Non Cond Gases | Cond/Steam /Non Cond Gases | Cond/Steam /Non Cond Gases |
| Line Size | 20mm | 20mm | 20mm | 20mm | 20mm | 20mm | 20mm | 20mm |
| Type C Leakage Test | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Pipe Length from Cont. to Inboard/Outboard Isolation Valve | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide |
| Leakage Through Packing[a] | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Leakage Past Seat[b] | [8]b6 | b6 | b6 | b6 | b6 | b6 | b6 | b6 |

[6]Two in series valves
[7]Two in series valves (F009/F010) in parallel with two in series valves (F011/F012)
[8]Closed barrier outside containment

**Table 6.2-24**

**Containment Isolation Valve Information for the Isolation Condenser System Loop A**

| Penetration Identification | B32-MPEN-0009[6] | | B32-MPEN-0013[7] | | | | B32-MPEN-0017[4] | |
|---|---|---|---|---|---|---|---|---|
| Valve Number | F007A | F008A | F009A | F010A | F011A | F012A | F013A | F014A |
| Location | Inboard | Inboard | Inboard | Inboard | Inboard | Inboard | Inboard | Inboard |
| Valve Type | GB, QBL | GB, QBL | GB, QBL | GB, QBL | ~~GB~~QBF, QBL, ~~GT~~ | ~~QBF~~GB, QBL, ~~GT~~ | ~~QBF, GB,~~ QBL, ~~GT~~ | Excess CK |
| Operator[(a)] | SO | SO | SO | SO | SO | SO | ~~N~~SO | ~~Flow CV~~SA |
| Normal Position | Closed | Closed | Closed | Closed | Closed | Closed | Open | Open |
| Shutdown Position | Closed | Closed | Closed | Closed | Closed | Closed | Open | Open |
| Post-Acc Position | Closed | Closed | Closed | Closed | Closed | Closed | Open/Close | Open |
| Power Fail Position | Closed | Closed | Closed | Closed | Closed | Closed | Closed | ~~As is~~N/A |
| Cont. Iso. Signal[(d)] | P | P | P | P | P | P | L,K | Q |
| Primary Actuation | Remote manual | Remote manual | Remote manual | Remote manual | Remote manual | Remote manual | Automatic | Diff Pressure |
| Secondary Actuation | N/A | N/A | N/A | N/A | N/A | N/A | Remote Manual | N/A |
| Closure Time (sec) | < 30 | < 30 | < 30 | < 30 | < 30 | < 30 | < 30 | < 30 |
| Power Source | Div. 1 | Div. 1 | Div. 2, 4 | Div. 2, 4 | Div. 1 | Div. 1 | Div. 1, 2, 3 | N/A |

* The piping and valve arrangement for these lines meet the requirement of 10 CFR50, App. A, GDC 55 because there are two normally closed valves in series in the line that leads from the suppression chamber back to the closed IC loop outside the containment.

Note: For explanation of codes, see legend on Table 6.2-15.

**Table 6.2-25**

**Containment Isolation Valve Information for the Isolation Condenser System Loop B**

| Penetration Identification | B32-MPEN-0002[9] | | B32-MPEN-0006[7] | |
|---|---|---|---|---|
| Valve Number | F001B | F002B | F003B | F004B |
| Valve Location | Steam Supply | Steam Supply | Condensate Return | Condensate Return |
| Applicable Basis | GDC 55* | GDC 55* | GDC 55* | GDC 55* |
| Tier 2 Figure | 5.1-3 | 5.1-3 | 5.1-3 | 5.1-3 |
| ESF | Yes | Yes | Yes | Yes |
| Fluid | Steam | Steam | Condensate | Condensate |
| Line Size | 350mm | 350mm | 200mm | 200mm |
| Type C Leakage Test | Yes | Yes | Yes | Yes |
| Pipe Length from Cont. to Inboard/Outboard Isolation Valve | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide |
| Leakage Through Packing[a] | N/A | N/A | N/A | N/A |
| Leakage Past Seat[b] | [10] b6 | b6 | b6 | b6 |
| Location | Inboard | Inboard | Inboard | Inboard |
| Valve Type[c] | -QBL, GT | QBL, GT | QB, GT | QBL, GT |
| Operator[c] | NMO/Acc | NO/Acc | NO/Acc | NMO/Acc |
| Normal Position | Open | Open | Open | Open |
| Shutdown Position | Open | Open | Open | Open |
| Post-Acc Position | Open[11] | Open[11a] | Open[11a] | Open[11a] |
| Power Fail Position | As is | As is | As is | As is |
| Cont. Iso. Signal[d] | I,K | I,K | I,K | I,K |
| Primary Actuation | Automatic | Automatic | Automatic | Automatic |
| Secondary Actuation | Remote manual | Remote manual | Remote manual | Remote manual |

[9] ~~Two in series valves~~
[10] Closed barrier outside containment (Piping of IC Quality Group B Design)
[11] Except on IC pipe or tube failure

**Table 6.2-25**

**Containment Isolation Valve Information for the Isolation Condenser System Loop B**

| Penetration Identification | B32-MPEN-0002[9] | | B32-MPEN-0006[7] | |
|---|---|---|---|---|
| Closure Time (sec) | < 60 | < 60 | < 35 | < 35 |
| Power Source | Div. 1, 3 | Div. 2, 4 | Div. 2, 4 | Div. 1, 3 |

* With respect to meeting the requirements of US NRC 10 CFR 50, Appendix A, General Design Criteria 55, the closed loop safety-related IC loop outside the containment is a "passive" substitute for an open "active" valve outside the containment. The combination of an already closed loop outside the containment plus the two series automatic isolation valves inside the containment comply with the requirements of the isolation guidelines of 10 CFR50, App. A, Criterion 55 and 56.

Note: For explanation of codes, see legend on Table 6.2-15.

## Table 6.2-26

## Containment Isolation Valve Information for the Isolation Condenser System Loop B

| Penetration Identification | B32-MPEN-0010[12] | | B32-MPEN-0014[13] | | | | B32-MPEN-0018[10] | |
|---|---|---|---|---|---|---|---|---|
| Valve Number | F007B | F008B | F009B | F010B | F011B | F012B | F013B | F014B |
| Valve Location | Upper Header Vent | Upper Header Vent | Lower Header Vent | Lower Header Vent | Lower Header Bypass Vent | Lower Header Bypass Vent | Purge line | Excess Flow Purge |
| Applicable Basis | GDC 55* | GDC 55* | GDC 55* | GDC 55* | GDC 55* | GDC 55* | GDC 55* | GDC 55* |
| Tier 2 Figure | 5.1-3 | 5.1-3 | 5.1-3 | 5.1-3 | 5.1-3 | 5.1-3 | 5.1-3 | 5.1-3 |
| ESF | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Fluid | Cond/Steam /Non Cond Gases | Cond/Steam /Non Cond Gases | Cond/Steam /Non Cond Gases | Cond/Steam /Non Cond Gases | Cond/Steam /Non Cond Gases | Cond/steam /Non Cond Gases | Cond/Steam /Non Cond Gases | Cond/Steam /Non Cond Gases |
| Line Size | 20mm | 20mm | 20mm | 20mm | 20mm | 20mm | 20mm | 20mm |
| Type C Leakage Test | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Pipe Length from Cont. to Inboard/Outboard Isolation Valve | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide |
| Leakage Through Packing[b] | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Leakage Past Seat[b] | [14]b6 | b6 | b6 | b6 | b6 | b6 | b6 | b6 |
| Location | Inboard | Inboard | Inboard | Inboard | Inboard | Inboard | Inboard | Inboard |

[12]Two in series valves
[13]Two in series valves (F009/F010) in parallel with two in series valves (F011/F012)
[14]Closed barrier outside containment

## Table 6.2-26

## Containment Isolation Valve Information for the Isolation Condenser System Loop B

| Penetration Identification | B32-MPEN-0010[b] | | B32-MPEN-0014[b] | | | | B32-MPEN-0018[b] | |
|---|---|---|---|---|---|---|---|---|
| Valve Number | F007B | F008B | F009B | F010B | F011B | F012B | F013B | F014B |
| Valve Type[a] | GB, QBL | GB, QBL | GB, QBL | GB, QBL | ~~, QBF~~GB, QBL~~, GT~~ | ~~, QBF~~GB, QBL~~, GT~~ | ~~, QBF,~~ GB, QBL~~, GT~~ | Excess-CK |
| Operator[c] | SO | SO | SO | SO | SO | SO | ~~N~~SO | ~~Flow-C~~V~~S~~A |
| Normal Position | Closed | Closed | Closed | Closed | Closed | Closed | Open | Open |
| Shutdown Position | Closed | Closed | Closed | Closed | Closed | Closed | Open | Open |
| Post-Acc Position | Closed | Closed | Closed | Closed | Closed | Closed | Open~~/~~Close | Open |
| Power Fail Position | Closed | Closed | Closed | Closed | Closed | Closed | Closed | ~~As is~~N/A |
| Cont. Iso. Signal[d] | P | P | P | P | P | P | L~~,~~K | Q |
| Primary Actuation | Remote manual | Remote manual | Remote manual | Remote manual | Remote manual | Remote manual | Automatic | Diff Pressure |
| Secondary Actuation | N/A | N/A | N/A | N/A | N/A | N/A | Remote Manual | N/A |
| Closure Time (sec) | < 30 | < 30 | < 30 | < 30 | < 30 | < 30 | < 30 | < 30 |
| Power Source | Div. 2 | Div. 2 | Div. 1, 3 | Div. 1, 3 | Div. 2 | Div. 2 | Div. 2, 3, 4 | N/A |

* The piping and valve arrangement for these lines meet the requirements of 10 CFR50, App. A, GDC 55 because there are two normally closed valves in series in the line that leads from the suppression chamber back to the closed IC loop outside the containment.

Note: For explanation of codes, see legend on Table 6.2-15.

**Table 6.2-27**

**Containment Isolation Valve Information for the Isolation Condenser System Loop C**

| Penetration Identification | B32-MPEN-0003[15] | | B32-MPEN-0007[13] | |
|---|---|---|---|---|
| Valve Number | F001C | F002C | F003C | F004C |
| Valve Location | Steam Supply | Steam Supply | Condensate Return | Condensate Return |
| Applicable Basis | GDC 55* | GDC 55* | GDC 55* | GDC 55* |
| Tier 2 Figure | 5.1-3 | 5.1-3 | 5.1-3 | 5.1-3 |
| ESF | Yes | Yes | Yes | Yes |
| Fluid | Steam | Steam | Condensate | Condensate |
| Line Size | 350 mm | 350 mm | 200 mm | 200 mm |
| Type C Leakage Test | Yes | Yes | Yes | Yes |
| Pipe Length from Cont. to Inboard/Outboard Isolation Valve | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide |
| Leakage Through Packing[(a)] | N/A | N/A | N/A | N/A |
| Leakage Past Seat[(b)] | [16] b6 | b6 | b6 | b6 |
| Location | Inboard | Inboard | Inboard | Inboard |
| Valve Type[(c)] | -QBL, GT | QBL, GT | QB, GT | QBL, GT |
| Operator[(c)] | NMO/Acc | NO/Acc | NO/Acc | NMO/Acc |
| Normal Position | Open | Open | Open | Open |
| Shutdown Position | Open | Open | Open | Open |
| Post-Acc Position | Open[17] | Open[12&] | Open[12&] | Open[12&] |
| Power Fail Position | As is | As is | As is | As is |
| Cont. Iso. Signal[(d)] | I,K | I,K | I,K | I,K |
| Primary Actuation | Automatic | Automatic | Automatic | Automatic |
| Secondary Actuation | Remote manual | Remote manual | Remote manual | Remote manual |
| Closure Time (sec) | < 60 | < 60 | < 35 | < 35 |
| Power Source | Div. 1, 3 | Div. 2, 4 | Div. 2, 4 | Div. 1, 3 |

* With respect to meeting the requirements of US NRC 10 CFR 50, Appendix A, General Design Criteria 55, the closed loop safety-related IC loop outside the containment is a

[15] ~~Two in series valves~~

[16] Closed barrier outside containment (Piping of IC Quality Group B Design)

[17] Except on IC pipe or tube failure

"passive" substitute for an open "active" valve outside the containment. The combination of an already closed loop outside the containment plus the two series automatic isolation valves inside the containment comply with the intent of the isolation guidelines of 10 CFR 50, App.A, Criterion 55 and 56.

Note: For explanation of codes, see legend on Table 6.2-15.

## Table 6.2-28

## Containment Isolation Valve Information for the Isolation Condenser System Loop C

| Penetration Identification | B32-MPEN-0011[18] | | B32-MPEN-0015[19] | | | | B32-MPEN-0019[16] | |
|---|---|---|---|---|---|---|---|---|
| Valve Number | F007C | F008C | F009C | F010C | F011C | F012C | F013C | F014C |
| Valve Location | Upper Header Vent | Upper Header Vent | Lower Header Vent | Lower Header Vent | Lower Header Bypass Vent | Lower Header Bypass Vent | Purge line | Excess Flow Purge |
| Applicable Basis | GDC 55* | GDC 55* | GDC 55* | GDC 55* | GDC 55* | GDC 55* | GDC 55* | GDC 55* |
| Tier 2 Figure | 5.1-3 | 5.1-3 | 5.1-3 | 5.1-3 | 5.1-3 | 5.1-3 | 5.1-3 | 5.1-3 |
| ESF | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Fluid | Cond/Steam /Non Cond Gases | Cond/Steam /Non Cond Gases | Cond/Steam /Non Cond Gases | Cond/Steam /Non Cond Gases | Cond/Steam /Non Cond Gases | Cond/steam /Non Cond Gases | Cond/Steam /Non Cond Gases | Cond/Steam /Non Cond Gases |
| Line Size | 20mm | 20mm | 20mm | 20mm | 20mm | 20mm | 20mm | 20mm |
| Type C Leakage Test | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Pipe Length from Cont. to Inboard/Outboard Isolation Valve | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide |
| Leakage Through Packing[a] | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Leakage Past Seat[b] | [20]b6 | b6 | b6 | b6 | b6 | b6 | b6 | b6 |
| Location | Inboard | Inboard | Inboard | Inboard | Inboard | Inboard | Inboard | Inboard |

[18]Two in series valves
[19]Two in series valves (F009/F010) in parallel with two in series valves (F011/F012)
[20]Closed barrier outside containment

## Table 6.2-28

## Containment Isolation Valve Information for the Isolation Condenser System Loop C

| Penetration Identification | B32-MPEN-0011[18] | | B32-MPEN-0015[19] | | | | B32-MPEN-0019[16] | |
|---|---|---|---|---|---|---|---|---|
| Valve Number | F007C | F008C | F009C | F010C | F011C | F012C | F013C | F014C |
| Valve Type[a] | GB, QBL | GB, QBL | GB, QBL | GB, QBL | ~~QBF~~GB, QBL~~, GT~~ | ~~QBF~~GB, QBL~~, GT~~ | ~~QBF,~~ GB, QBL~~, GT~~ | Excess-CK |
| Operator[a] | SO | SO | SO | SO | SO | SO | ~~N~~SO | ~~Flow-C~~VSA |
| Normal Position | Closed | Closed | Closed | Closed | Closed | Closed | Open | Open |
| Shutdown Position | Closed | Closed | Closed | Closed | Closed | Closed | Open | Open |
| Post-Acc Position | Closed | Closed | Closed | Closed | Closed | Closed | Open/Close | Open |
| Power Fail Position | Closed | Closed | Closed | Closed | Closed | Closed | Closed | ~~As is~~N/A |
| Cont. Iso. Signal[d] | P | P | P | P | P | P | I, K | Q |
| Primary Actuation | Remote manual | Remote manual | Remote manual | Remote manual | Remote manual | Remote manual | Automatic | Diff Pressure |
| Secondary Actuation | N/A | N/A | N/A | N/A | N/A | N/A | Remote Manual | N/A |
| Closure Time (sec) | < 30 | < 30 | < 30 | < 30 | < 30 | < 30 | < 30 | < 30 |
| Power Source | Div. 3 | Div. 3 | Div. 2, 4 | Div. 2, 4 | Div. 3 | Div. 3 | Div. 3, 4, 1 | N/A |

* The piping and valve arrangement for these lines meet the requirements of 10 CFR 50, App. A, GDC 55 because there are two normally closed valves in series in the line that leads from the suppression chamber back to the closed IC loop outside the containment.

Note: For explanation of codes, see legend on Table 6.2-15.

**Table 6.2-29**

**Containment Isolation Valve Information for the Isolation Condenser System Loop D**

| Penetration Identification | B32-MPEN-0004[21] | | B32-MPEN-0008[19] | |
|---|---|---|---|---|
| Valve Number | F001D | F002D | F003D | F004D |
| Valve Location | Steam Supply | Steam Supply | Condensate Return | Condensate Return |
| Applicable Basis | GDC 55* | GDC 55* | GDC 55* | GDC 55* |
| Tier 2 Figure | 5.1-3 | 5.1-3 | 5.1-3 | 5.1-3 |
| ESF | Yes | Yes | Yes | Yes |
| Fluid | Steam | Steam | Condensate | Condensate |
| Line Size | 350 mm | 350 mm | 200 mm | 200 mm |
| Type C Leakage Test | Yes | Yes | Yes | Yes |
| Pipe Length from Cont. to Inboard/Outboard Isolation Valve | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide |
| Leakage Through Packing[a] | N/A | N/A | N/A | N/A |
| Leakage Past Seat[b] | [22] b6 | B6 | b6 | b6 |
| Location | Inboard | Inboard | Inboard | Inboard |
| Valve Type[c] | -QBL, GT | QBL, GT | QBL, GT | QBL, GT |
| Operator[c] | NMO/Acc | NO/Acc | NO/Acc | NMO/Acc |
| Normal Position | Open | Open | Open | Open |
| Shutdown Position | Open | Open | Open | Open |
| Post-Acc Position | Open[23] | Open[23] | Open[23] | Open[23] |
| Power Fail Position | As is | As is | As is | As is |
| Cont. Iso. Signal[d] | I,K | I,K | I,K | I,K |
| Primary Actuation | Automatic | Automatic | Automatic | Automatic |
| Secondary Actuation | Remote manual | Remote manual | Remote manual | Remote manual |
| Closure Time (sec) | < 60 | < 60 | < 35 | < 35 |
| Power Source | Div. 1, 3 | Div. 2, 4 | Div. 2, 4 | Div. 1, 3 |

~~[a] Two in series valves~~
[22] Closed barrier outside containment (Piping of IC Quality Group B Design)
[23] Except on IC pipe or tube failure

- With respect to meeting the requirements of US NRC 10 CFR 50, Appendix A, General Design Criteria 55, the closed loop safety-related IC loop outside the containment is a "passive" substitute for an open "active" valve outside the containment. The combination of an already isolated loop outside the containment plus the two series automatic isolation valves inside the containment comply with the requirements of the isolation guidelines of 10 CFR 50, App. A, Criterion 55 and 56.

Note: For explanation of codes, see legend on Table 6.2-15.

## Table 6.2-30

## Containment Isolation Valve Information for the Isolation Condenser System Loop D

| Penetration Identification | B32-MPEN-0012[24] | | B32-MPEN-0016[25] | | | | B32-MPEN-0020[22] | |
|---|---|---|---|---|---|---|---|---|
| Valve Number | F007D | F008D | F009D | F010D | F011D | F012D | F013D | F014D |
| Valve Location | Upper Header Vent | Upper Header Vent | Lower Header Vent | Lower Header Vent | Lower Header Bypass Vent | Lower Header Bypass Vent | Purge line | Excess Flow Purge |
| Applicable Basis | GDC 55* | GDC 55* | GDC 55* | GDC 55* | GDC 55* | GDC 55* | GDC 55* | GDC 55* |
| Tier 2 Figure | 5.1-3 | 5.1-3 | 5.1-3 | 5.1-3 | 5.1-3 | 5.1-3 | 5.1-3 | 5.1-3 |
| ESF | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Fluid | Cond/Steam /Non Cond Gases | Cond/Steam /Non Cond Gases | Cond/Steam /Non Cond Gases | Cond/Steam /Non Cond Gases | Cond/Steam /Non Cond Gases | Cond/steam /Non Cond Gases | Cond/Steam /Non Cond Gases | Cond/Steam /Non Cond Gases |
| Line Size | 20mm | 20mm | 20mm | 20mm | 20mm | 20mm | 20mm | 20mm |
| Type C Leakage Test | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Pipe Length from Cont. to Inboard/Outboard Isolation Valve | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide |
| Leakage Through Packing[a] | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Leakage Past Seat[b] | [26] b6 | b6 | b6 | b6 | b6 | b6 | b6 | b6 |
| Location | Inboard | Inboard | Inboard | Inboard | Inboard | Inboard | Inboard | Inboard |

[24]Two in series valves
[25]Two in series valves (F009/F010) in parallel with two in series valves (F011/F012)
[26]Closed barrier outside containment

## Table 6.2-30

## Containment Isolation Valve Information for the Isolation Condenser System Loop D

| Penetration Identification | B32-MPEN-0012[24] | | B32-MPEN-0016[25] | | | | B32-MPEN-0020[22] | |
|---|---|---|---|---|---|---|---|---|
| Valve Number | F007D | F008D | F009D | F010D | F011D | F012D | F013D | F014D |
| Valve Type[a] | GB, QBL | GB, QBL | GB, QBL | GB, QBL | ~~QBF~~GB, QBL~~, GT~~ | GB, QBL~~, QBF, GT~~ | ~~QBL, GB,~~ QBF~~, GT~~ | Excess-CK |
| Operator[c] | SO | SO | SO | SO | SO | SO | ~~N~~SO | ~~Flow CV~~SA |
| Normal Position | Closed | Closed | Closed | Closed | Closed | Closed | Open | Open |
| Shutdown Position | Closed | Closed | Closed | Closed | Closed | Closed | Open | Open |
| Post-Acc Position | Closed | Closed | Closed | Closed | Closed | Closed | Open | Open |
| Power Fail Position | Closed | Closed | Closed | Closed | Closed | Closed | Closed | ~~As is~~N/A |
| Cont. Iso. Signal[d] | P | P | P | P | P | P | L, K | Q |
| Primary Actuation | Remote manual | Remote manual | Remote manual | Remote manual | Remote manual | Remote manual | Automatic | Diff Pressure |
| Secondary Actuation | N/A | N/A | N/A | N/A | N/A | N/A | Remote Manual | N/A |
| Closure Time (sec) | < 30 | < 30 | < 30 | < 30 | < 30 | < 30 | < 30 | < 30 |
| Power Source | Div. 4 | Div. 4 | Div. 1, 3 | Div. 1, 3 | Div. 4 | Div. 4 | Div. 4, 1, 2 | N/A |

* The piping and valve arrangement for these lines meet the requirements of 10 CFR50, App. A, GDC 55 because there are two normally closed valves in series in the line that leads from the suppression chamber back to the closed IC loop outside the containment.

Note: For explanation of codes, see legend on Table 6.2-15.

**Table 6.2-31**
**Containment Isolation Valve Information for the Reactor Water Cleanup/Shutdown Cooling System**

| Penetration Identification | G31-MPEN-0001 | | G31-MPEN-0003 | | G31-MPEN-0002 | | G31-MPEN-0004 | |
|---|---|---|---|---|---|---|---|---|
| Valve No. | F002A | F003A | F007A | F008A | F002B | F003B | F007B | F008B |
| Applicable Basis | GDC 55 | GDC 55 | GDC 55 | GDC 55 | GDC 55 | GDC 55 | GDC 55 | GDC 55 |
| Tier 2 Figure | 5.1-4 | 5.1-4 | 5.1-4 | 5.1-4 | 5.1-4 | 5.1-4 | 5.1-4 | 5.1-4 |
| ESF | No | No | No | No | No | No | No | No |
| Fluid | Water | Water | Water | Water | Water | Water | Water | Water |
| Line Size | 250 mm | 250 mm. | 150 mm | 150 mm | 250 mm | 250 mm. | 150 mm | 150 mm |
| Type C Leakage Test | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Pipe Length from Cont. to Inboard/Outboard Isolation Valve | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide |
| Leakage Through Packing[a] | N/A | ($a_1$) | N/A | ($a_1$) | N/A | ($a_1$) | N/A | ($a_1$) |
| Leakage Past Seat[b] | ($b_3$) | ($b_3$) | ($b_3$) | ($b_3$) | ($b_3$) | ($b_3$) | ($b_3$) | ($b_3$) |
| Location | Inboard | Outboard | Inboard | Outboard | Inboard | Outboard | Inboard | Outboard |
| Valve Type[g] | GBT, QBL, AF | GT, QBL, AF | GBT, QBL, AF | GT, QBL, AF | GBT, QBL, AF | GT, QBL, AF | GBT, QBL, AF | GT, QBL, AF |
| Operator[c] | NO | AO | NO | AO | NO | AO | NO | AO |
| Normal Position | Open/C | Open/C | Open/C | Open/C | Open/C | Open/C | Open/C | Open/C |
| Shutdown Position | Open/C | Open/C | Open/C | Open/C | Open/C | Open/C | Open/C | Open/C |
| Post-Acc Position | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed |
| Power Fail Position | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed |
| Cont. Iso. Signal[d] | B,C,F,M,N | B,C,F,M,N | B,C,F,M,N | B,C,F,M,N | B,C,F,M,N | B,C,F,M,N | B,C,F,M,N | B,C,F,M,N |

**Table 6.2-31**
**Containment Isolation Valve Information for the Reactor Water Cleanup/Shutdown Cooling System**

| Penetration Identification | G31-MPEN-0001 | | G31-MPEN-0003 | | G31-MPEN-0002 | | G31-MPEN-0004 | |
|---|---|---|---|---|---|---|---|---|
| Valve No. | F002A | F003A | F007A | F008A | F002B | F003B | F007B | F008B |
| Primary Actuation | Automatic | Automatic | Automatic | Automatic | Automatic | Automatic | Automatic | Automatic |
| Secondary Actuation | Remote manual | Remote manual | Remote manual | Remote manual | Remote manual | Remote manual | Remote manual | Remote manual |
| Closure Time (sec) | <20 | <20 | <15 | <15 | <20 | <20 | <15 | <15 |
| Power Source | Div. 2, 4 | Div. 1, 3 | Div. 2, 4 | Div 1, 3 | Div. 2, 4 | Div. 1, 3 | Div. 2, 4 | Div. 1, 3 |

Note: For explanation of codes, see legend on Table 6.2-15.

**Table 6.2-31a**

**Containment Isolation Valve Information for the Reactor Water Cleanup/Shutdown Cooling System**

| Penetration Identification | G31-MPEN-0005 | | G31-MPEN-0006 | |
|---|---|---|---|---|
| Valve No. | F038A | F039A | F038B | F039B |
| Applicable Basis | GDC 55 | GDC 55 | GDC 55 | GDC 55 |
| Tier 2 Figure | 5.1-4 | 5.1-4 | 5.1-4 | 5.1-4 |
| ESF | No | No | No | No |
| Fluid | Water | Water | Water | Water |
| Line Size | 20 mm. | 20 mm | 20 mm. | 20 mm. |
| Type C Leakage Test | Yes | Yes | Yes | Yes |
| Pipe Length from Cont. to Inboard/Outboard Isolation Valve | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide |
| Leakage Through Packing[a] | N/A | ($a_1$) | N/A | ($a_1$) |
| Leakage Past Seat[b] | b7 | b7 | b7 | b7 |
| Location | Inboard | Outboard | Inboard | Outboard |
| Valve Type[c] | ~~GB, QBL~~ | ~~GB, QBL~~ | ~~GB, QBL~~ | ~~GB, QBL~~ |
| Operator[c] | SO | SO | SO | SO |
| Normal Position | ~~Open~~/Closed | ~~Open~~/Closed | ~~Open~~/Closed | ~~Open~~/Closed |
| Shutdown Position | Open/Closed | Open/Closed | Open/Closed | Open/Closed |
| Post-Acc Position | Open/Closed | Open/Closed | Open/Closed | Open/Closed |
| Power Fail Position | Closed | Closed | Closed | Closed |
| Cont. Iso. Signal[d] | B,C,F,M,N | B,C,F,M,N | B,C,F,M,N | B,C,F,M,N |
| Primary Actuation | Automatic | Automatic | Automatic | Automatic |
| Secondary Actuation | Remote manual | Remote manual | Remote manual | Remote manual |
| Closure Time (sec) | <15 | <15 | <15 | <15 |
| Power Source | Div. 2, 4 | Div. 1, 3 | Div. 2, 4 | Div 1, 3 |

Note: For explanation of codes, see legend on Table 6.2-15.

**Table 6.2-32a**

**Containment Isolation Valve Information for the Standby Liquid Control System**

| Penetration Identification | C41-MPEN-0001 | | | |
|---|---|---|---|---|
| Valve No. | F005A | F004A | F003A | F003C |
| Applicable Basis | GDC 55 | GDC 55 | GDC 55 | GDC 55 |
| Tier 2 Figure | 9.3-1 | 9.3-1 | 9.3-1 | 9.3-1 |
| ESF | Yes | Yes | Yes | Yes |
| Fluid | Boron/Water | Boron/Water | Boron/Water | Boron/Water |
| Line Size | 80 mm | 80 mm | 80 mm | 80 mm |
| Type C Leakage Test | Yes | Yes | Yes | Yes |
| Pipe Length from Cont. to Inboard/Outboard Isolation Valve | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide |
| Leakage Through Packing(a) | N/A | (a1) | (a1) | (a1) |
| Leakage Past Seat(b) | (b5) | (b5) | (b5) | (b5) |
| Location | Inboard | Outboard | Outboard | Outboard |
| Valve Type | CK~~, GB, AF~~ | CK~~, GB, AF~~ | ~~GT~~SQ* | ~~GT~~SQ* |
| Operator(c) | ~~N/A~~SA | ~~N/A~~SA | ~~N/A~~EX** | ~~N/A~~EX** |
| Normal Position | Closed | Closed | Closed | Closed |
| Shutdown Position | Closed | Closed | Closed | Closed |
| Post-Acc Position | ~~Operable~~Open/ Close | ~~Operable~~Open /Close | Open | Open |
| Power Fail Position | N/A | N/A | ~~As is~~N/A | ~~As is~~N/A |
| Cont. Iso. Signal(d) | Q | Q | N/A** | N/A** |
| Primary Actuation | Flow | Flow | N/A** | N/A** |
| Secondary Actuation | N/A | N/A | N/A** | N/A** |
| Closure Time (sec) | N/A | N/A | N/A** | N/A** |
| Power Source | N/A | N/A | N/A** | N/A** |

* The disk/inlet-fitting cap is hermetically sealed and when valve is actuated, the cap is sheared to permanently open the flow path.
**Not relevant to the valve isolation function.
Note: For explanation of codes, see legend on Table 6.2-15.

**Table 6.2-32b**

**Containment Isolation Valve Information for the Standby Liquid Control System**

| Penetration Identification | C41-MPEN-0002 | | | |
|---|---|---|---|---|
| Valve No. | F005B | F004B | F003B | F003D |
| Applicable Basis | GDC 55 | GDC 55 | GDC 55 | GDC 55 |
| Tier 2 Figure | 9.3-1 | 9.3-1 | 9.3-1 | 9.3-1 |
| ESF | Yes | Yes | Yes | Yes |
| Fluid | Boron/Water | Boron/Water | Boron/Water | Boron/Water |
| Line Size | 80 mm | 80 mm | 80 mm | 80 mm |
| Type C Leakage Test | Yes | Yes | Yes | Yes |
| Pipe Length from Cont. to Inboard/Outboard Isolation Valve | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide |
| Leakage Through Packing(a) | N/A | (a1) | (a1) | (a1) |
| Leakage Past Seat(b) | (b5) | (b5) | (b5) | (b5) |
| Location | Inboard | Outboard | Outboard | Outboard |
| Valve Type | CK~~, GB, AF~~ | CK~~, GB, AF~~ | ~~GT~~SQ* | ~~GT~~SQ* |
| Operator(c) | ~~N/A~~SA | ~~N/A~~SA | ~~N/A~~**EX | ~~N/A~~**EX |
| Normal Position | Closed | Closed | Closed | Closed |
| Shutdown Position | Closed | Closed | Closed | Closed |
| Post-Acc Position | ~~Operable~~Open/Close | ~~Operable~~Open/Close | Open | Open |
| Power Fail Position | N/A | N/A | ~~As is~~N/A | ~~As is~~N/A |
| Cont. Iso. Signal(d) | Q | Q | N/A** | N/A** |
| Primary Actuation | Flow | Flow | N/A** | N/A** |
| Secondary Actuation | N/A | N/A | N/A** | N/A** |
| Closure Time (sec) | N/A | N/A | N/A** | N/A** |
| Power Source | N/A | N/A | N/A** | N/A** |

* The disk/inlet-fitting cap is hermetically sealed and when valve is actuated, the cap is sheared to permanently open the flow path.
**Not relevant to the valve isolation function.
Note: For explanation of codes, see legend on Table 6.2-15.

**Table 6.2-33a**

**Containment Isolation Valve Information for the Fuel and Auxiliary Pools Cooling System**

| Penetration Identification | G21-MPEN-0005 | | G21-MPEN-0002 | |
|---|---|---|---|---|
| Valve No. | F321A | F322A | F306A | F307A |
| Applicable Basis | GDC 56 | GDC 56 | GDC 56 | GDC 56 |
| Tier 2 Figure | 9.1-1 | 9.1-1 | 9.1-1 | 9.1-1 |
| ESF | No | No | No | No |
| Fluid | Water | Water | Water | Water |
| Line Size | 250 mm. | 250 mm. | 250 mm. | 250 mm. |
| Type C Leakage Test | Yes | Yes | Yes | Yes |
| Pipe Length from Cont. to Inboard/Outboard Isolation Valve | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide |
| Leakage Through Packing[a] | ($a_1$) | ($a_1$) | ($a_1$) | N/A |
| Leakage Past Seat[b] | b6 | b6 | b6 | b6 |
| Location | Outboard | Outboard | Outboard | Inboard |
| Valve Type | GT, QBL~~, QT, AF~~ | GT, QBL~~T, AF~~ | GT, QBL~~T, AF~~ | ~~CK, AF~~ |
| Operator[c] | NMO | NMO | NMO | ~~N/A~~SA |
| Normal Position | Closed[27] | Closed[27] | Closed[27] | N/A |
| Shutdown Position | Closed[27] | Closed[27] | Closed[27] | N/A |
| Post-Acc Position | Closed[28] | Closed[28] | Closed[29] | ~~N/A~~Closed |
| Power Fail Position | As-is | As-is | As-is | N/A |
| Cont. Iso. Signal[d] | P | P | P | Q |
| Primary Actuation | Remote manual | Remote manual | Remote manual | Flow |

[27]The valve is open occasionally for the suppression pool cooling and cleanup function.
[28]The valve is opened remote manually for performing LPCI, Drywell Spray, or Suppression Pool Cooling function if required.
[29]The valve is opened remote manually for performing Suppression Pool Cooling function if required.

**Table 6.2-33a**

**Containment Isolation Valve Information for the Fuel and Auxiliary Pools Cooling System**

| Penetration Identification | G21-MPEN-0005 | | G21-MPEN-0002 | |
|---|---|---|---|---|
| Valve No. | F321A | F322A | F306A | F307A |
| Secondary Actuation | Local manual | Local manual | Local manual | N/A |
| Closure Time (sec) | <30 | <30 | <30 | N/A |
| Power Source | Div. 1, 3 | Div. 1, 3 | Div. 1, 3 | N/A |

Note: For explanation of codes, see legend on Table 6.2-15.

**Table 6.2-33b**

**Containment Isolation Valve Information for the Fuel and Auxiliary Pools Cooling System**

| Penetration Identification | G21-MPEN-0007 | | G21-MPEN-0006 | |
|---|---|---|---|---|
| Valve No. | F321B | F322B | F306B | F307B |
| Applicable Basis | GDC 56 | GDC 56 | GDC 56 | GDC 56 |
| Tier 2 Figure | 9.1-1 | 9.1-1 | 9.1-1 | 9.1-1 |
| ESF | No | No | No | No |
| Fluid | Water | Water | Water | Water |
| Line Size | 250 mm. | 250 mm. | 250 mm. | 250 mm. |
| Type C Leakage Test | Yes | Yes | Yes | Yes |
| Pipe Length from Cont. to Inboard/Outboard Isolation Valve | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide |
| Leakage Through Packing[a] | ($a_1$) | ($a_1$) | ($a_1$) | N/A |
| Leakage Past Seat[b] | b6 | b6 | b6 | b6 |
| Location | Outboard | Outboard | Outboard | Inboard |
| Valve Type | GT, QBL~~T, AF~~ | GT, QBL~~T, AF~~ | GT, QBL~~T, AF~~ | CK, ~~AF~~ |
| Operator[c] | NMO | NMO | NMO | ~~N/A~~SA |
| Normal Position | Closed[30] | Closed[30] | Closed[30] | N/A |
| Shutdown Position | Closed[31] | Closed[31] | Closed[31] | N/A |
| Post-Acc Position | Closed[32] | Closed[32] | Closed[33] | ~~N/A~~Closed |
| Power Fail Position | As-is | As-is | As-is | N/A |
| Cont. Iso. Signal[d] | P | P | P | Q |
| Primary Actuation | Remote manual | Remote manual | Remote manual | Self |

[30] The valve is open occasionally for the suppression pool cooling and cleanup function.
[31] The valve is open occasionally for the suppression pool cooling and cleanup function.
[32] The valve is opened remote manually for performing LPCI, Drywell Spray, or Suppression Pool Cooling function if required.
[33] The valve is opened remote manually for performing Suppression Pool Cooling function if required.

**Table 6.2-33b**

**Containment Isolation Valve Information for the Fuel and Auxiliary Pools Cooling System**

| Penetration Identification | G21-MPEN-0007 | | G21-MPEN-0006 | |
|---|---|---|---|---|
| Valve No. | F321B | F322B | F306B | F307B |
| Secondary Actuation | Local manual | Local manual | Local manual | N/A |
| Closure Time (sec) | <30 | <30 | <30 | N/A |
| Power Source | Div. 2, 4 | Div. 2, 4 | Div. 2, 4 | N/A |

Note: For explanation of codes, see legend on Table 6.2-15.

**Table 6.2-34**

**Containment Isolation Valve Information for the Fuel and Auxiliary Pools Cooling System**

| Penetration Identification | G21-MPEN-0004 | | G21-MPEN-0003 | |
|---|---|---|---|---|
| Valve No. | F323 | F324 | F303 | F304 |
| Applicable Basis | GDC 56 | GDC 56 | GDC 56 | GDC 56 |
| Tier 2 Figure | 9.1-1 | 9.1-1 | 9.1-1 | 9.1-1 |
| ESF | No | No | No | No |
| Fluid | Water | Water | Water | Water |
| Line Size | 250 mm. | 250 mm | 250 mm. | 250 mm. |
| Type C Leakage Test | Yes | Yes | Yes | Yes |
| Pipe Length from Cont. to Inboard/Outboard Isolation Valve | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide |
| Leakage Through Packing[a] | N/A | ($a_1$) | ($a_1$) | N/A |
| Leakage Past Seat[b] | b6 | b6 | b6 | b6 |
| Location | Inboard | Outboard | Outboard | Inboard |
| Valve Type | GBT, QBLT, AF | GT, QBLT, AF | GT, QBLT, AF | CK, AF |
| Operator[c] | NOAO | AONO | AOAO | N/ASA |
| Normal Position | Closed[34] | Closed[34] | Closed[34] | N/A |
| Shutdown Position | Closed | Closed | Closed | N/A |
| Post-Acc Position | Closed | Closed | Closed | N/AClosed |
| Power Fail Position | Closed | ClosedAs-is | Closed | N/A |
| Cont. Iso. Signal[d] | B,C,H | B,C,H | B,C,H | Q |
| Primary Actuation | Automatic | Automatic | Automatic | Self |
| Secondary Actuation | Remote manual | Remote manual | Remote manual | N/A |
| Closure Time (sec) | <30 | <30 | <30 | N/A |

[34] The valve is open occasionally for GDCS pools cooling and cleanup function.

**Table 6.2-34**

**Containment Isolation Valve Information for the Fuel and Auxiliary Pools Cooling System**

| Penetration Identification | G21-MPEN-0004 | | G21-MPEN-0003 | |
|---|---|---|---|---|
| Valve No. | F323 | F324 | F303 | F304 |
| Power Source | Div. 2, 4 | Div. 1, 3 | Div. 1, 2, 3 | N/A |

Note: For explanation of codes, see legend on Table 6.2-15.

**Table 6.2-35**

**Containment Isolation Valve Information for the Fuel and Auxiliary Pools Cooling System**

| Penetration Identification | G21-MPEN-0001 | |
|---|---|---|
| Valve No. | F309 | F310 |
| Applicable Basis | GDC 56 | GDC 56 |
| Tier 2 Figure | 9.1-1 | 9.1-1 |
| ESF | No | No |
| Fluid | Water | Water |
| Line Size | 250 mm | 250 mm |
| Type C Leakage Test | Yes | Yes |
| Pipe Length from Cont. to Inboard/Outboard Isolation Valve | COL holder to provide | COL holder to provide |
| Leakage Through Packing[a] | ($a_1$) | N/A |
| Leakage Past Seat[b] | b6 | b6 |
| Location | Outboard | Inboard |
| Valve Type | ~~GT, OBLB, AF~~ | ~~CK, AF~~ |
| Operator[c] | AO | ~~N/A~~SA |
| Normal Position | Closed | N/A |
| Shutdown Position | Closed | N/A |
| Post-Acc. Position | Closed[35] | ~~N/A~~Closed |
| Power Fail Position | Closed | N/A |
| Cont. Iso. Signal[d] | P | Q |
| Primary Actuation | Electrical | Flow |
| Secondary Actuation | Remote manual | N/A |
| Closure Time(sec) | <35 | N/A |
| Power Source | Div. 1, 2, 3 | N/A |

Note: For explanation of codes, see legend on Table 6.2-15.

[35] The valve would be opened remote manually to perform the drywell spray function if required.

**Table 6.2-36**

**Containment Isolation Valve Information for the Containment Inerting System**

| Penetration Identification | T31-MPEN-0004 | | T31-MPEN-0003[36] | | | |
|---|---|---|---|---|---|---|
| Valve No. | F012 | F011 | F010 | F011 | F014 | F015 |
| Applicable Basis | GDC 56 | GDC 56 | GDC 56 | GDC 56 | GDC 56 | GDC 56 |
| Tier 2 Figure | 9.4-14 | 9.4-14 | 9.4-14 | 9.4-14 | 9.4-14 | 9.4-14 |
| ESF | No | No | No | No | No | No |
| Fluid | Air/$N_2$ | Air/$N_2$ | Air/$N_2$ | Air/$N_2$ | Air/$N_2$ | Air/$N_2$ |
| Line Size | 350 mm | 500 mm | 400 mm | 500 mm | 25 mm | 25mm |
| Type C Leakage Test | Yes | Yes | Yes | Yes | Yes | Yes |
| Pipe Length from Cont. to Inboard/Outboard Isolation Valve | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide |
| Leakage Through Packing[(a)] | ($a_1$) | ($a_1$) | ($a_1$) | ($a_1$) | ($a_1$) | ($a_1$) |
| Leakage Past Seat[(b)] | ($b_2$/$b_5$) | ($b_2$/$b_5$) | ($b_2$/$b_5$) | ($b_2$/$b_5$) | ($b_2$/$b_5$) | ($b_2$/$b_5$) |
| Location | Outboard | Outboard | Outboard | Outboard | Outboard | Outboard |
| Valve Type | QBF, QBL | QBF, QBL | QBF, QBL | QBF, QBL | GB, QBL, ~~GT~~ | GB, QBL, ~~GT~~ |
| Operator[(c)] | AO | AO | AO | AO | AO | AO |
| Normal Position | Closed | Closed | Closed | Closed | Closed[37] | Closed[37] |
| Shutdown Position | Closed[38] | Closed[38] | Closed[38] | Closed[38] | Closed | Closed |
| Post-Acc Position | Closed | Closed | Closed | Closed | Closed | Closed |
| Power Fail Position | Closed | Closed | Closed | Closed | Closed | Closed |
| Cont. Iso. Signal[(d)] | B,C,H,T | B,C,H,T | B,C,H,T | B,C,H,T | B,C,H,T | B,C,H,T |
| Primary Actuation | Automatic | Automatic | Automatic | Automatic | Automatic | Automatic |

[36] Two valves in series (F011/F010) in parallel with two in series valves (F015/F014).
[37] Open to purge excess pressure to prevent inadvertent reactor scram after which are closed.
[38] Open during the early stage of Inerting/De-inerting modes to purge resident air/N2 after which are closed.

**Table 6.2-36**

**Containment Isolation Valve Information for the Containment Inerting System**

| Penetration Identification | T31-MPEN-0004 | | T31-MPEN-0003[36] | | | |
|---|---|---|---|---|---|---|
| Valve No. | F012 | F011 | F010 | F011 | F014 | F015 |
| Secondary Actuation | Remote manual | Remote manual | Remote manual | Remote manual | Remote manual | Remote manual |
| Closure Time (sec) | < 30 | < 30 | < 30 | < 30 | < 5 | < 5 |
| Power Source | Div. 2, 4 | Div. 1, 3 | Div. 2, 4 | Div. 1, 3 | Div. 2, 4 | Div. 1, 3 |

Note: For explanation of codes, see legend on Table 6.2-15.

**Table 6.2-37**

**Containment Isolation Valve Information for the Containment Inerting System**

| Penetration Identification | T31-MPEN-0002[39] | | | |
|---|---|---|---|---|
| Valve No. | F008 | F007 | F024 | F023 |
| Applicable Basis | GDC 56 | GDC 56 | GDC 56 | GDC 56 |
| Tier 2 Figure | 9.4-14 | 9.4-14 | 9.4-14 | 9.4-14 |
| ESF | No | No | No | No |
| Fluid | Air/$N_2$ | Air/$N_2$ | Air/$N_2$ | Air/$N_2$ |
| Line Size | 500 mm | 350 mm | 25 mm | 25 mm |
| Type C Leakage Test | Yes | Yes | Yes | Yes |
| Pipe Length from Cont. to Inboard/Outboard Isolation Valve | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide |
| Leakage Through Packing[(a)] | ($a_1$) | ($a_1$) | ($a_1$) | ($a_1$) |
| Leakage Past Seat[(b)] | ($b_2$) | ($b_2$) | ($b_2$) | ($b_2$) |
| Location | Outboard | Outboard | Outboard | Outboard |
| Valve Type | QBF, QBL | QBF, QBL | ~~GB,~~ QBL, QBF~~GT~~ | ~~GB,~~ QBL, QBF~~GT~~ |
| Operator[(c)] | AO | AO | AO | AO |
| Normal Position | Closed | Closed | Open | Open |
| Shutdown Position | Open | Open | Closed | Closed |
| Post-Acc Position | Closed | Closed | Closed | Closed |
| Power Fail Position | Closed | Closed | Closed | Closed |
| Cont. Iso. Signal[(d)] | B,C,H,T | B,C,H,T | B,C,H,T | B,C,H,T |
| Primary Actuation | Automatic | Automatic | Automatic | Automatic |
| Secondary Actuation | Remote manual | Remote manual | Remote manual | Remote manual |

[39] Valve F008 in series with F007, valve F024 in series with F023.

**Table 6.2-37**

**Containment Isolation Valve Information for the Containment Inerting System**

| Penetration Identification | T31-MPEN-0002[39] | | | |
|---|---|---|---|---|
| Valve No. | F008 | F007 | F024 | F023 |
| Closure Time (sec.) | < 30 | < 30 | < 5 | < 5 |
| Power Source | Div. 1, 3 | Div. 2, 4 | Div. 2, 4 | Div. 1, 3 |

Note: For explanation of codes, see legend on Table 6.2-15.

**Table 6.2-38**

**Containment Isolation Valve Information for the Containment Inerting System**

| Penetration Identification | T31-MPEN-0001[40] | | | |
|---|---|---|---|---|
| Valve No. | F025 | F023 | F008 | F009 |
| Applicable Basis | GDC 56 | GDC 56 | GDC 56 | GDC 56 |
| Tier 2 Figure | 9.4-14 | 9.4-14 | 9.4-14 | 9.4-14 |
| ESF | No | No | No | No |
| Fluid | Air/$N_2$ | Air/$N_2$ | Air/$N_2$ | Air/$N_2$ |
| Line Size | 25 mm | 25 mm | 500 mm | 350 mm |
| Type C Leakage Test | Yes | Yes | Yes | Yes |
| Pipe Length from Cont. to Inboard/Outboard Isolation Valve | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide |
| Leakage Through Packing[a] | ($a_1$) | ($a_1$) | ($a_1$) | ($a_1$) |
| Leakage Past Seat[b] | ($b_2$) | ($b_2$) | ($b_2$) | ($b_2$) |
| Location | Outboard | Outboard | Outboard | Outboard |
| Valve Type | ~~GB,~~ QBL, QBF~~GT~~ | ~~GB,~~ QBL, QBF~~GT~~ | QBF, QBL | QBF, QBL |
| Operator[c] | AO | AO | AO | AO |
| Normal Position | Open | Open | Closed | Closed |
| Shutdown Position | Closed | Closed | Open | Open |
| Post-Acc Position | Closed | Closed | Closed | Closed |
| Power Fail Position | Closed | Closed | Closed | Closed |
| Cont. Iso. Signal[d] | B,C,H,T | B,C,H,T | B,C,H,T | B,C,H,T |
| Primary Actuation | Automatic | Automatic | Automatic | Automatic |

[40] Valve F008 in series with F009, valve F025 in series with F023.

**Table 6.2-38**

**Containment Isolation Valve Information for the Containment Inerting System**

| Penetration Identification | T31-MPEN-0001[40] | | | |
|---|---|---|---|---|
| Valve No. | F025 | F023 | F008 | F009 |
| Secondary Actuation | Remote manual | Remote manual | Remote manual | Remote manual |
| Closure Time (sec) | < 5 | < 5 | < 30 | < 30 |
| Power Source | Div. 2, 4 | Div. 1, 3 | Div. 1, 3 | Div. 2, 4 |

Note: For explanation of codes, see legend on Table 6.2-15.

**Table 6.2-39**

**Containment Isolation Valve Information for the Chilled Water System Train A**

| Penetration Identification | P25-MPEN-0001 | | P25-MPEN-0002 | |
|---|---|---|---|---|
| Valve No. | F023A | F024A | F025A | F026A |
| Applicable Basis | GDC 56 | GDC 56 | GDC 56 | GDC 56 |
| Tier 2 Figure | 9.2-3 | 9.2-3 | 9.2-3 | 9.2-3 |
| ESF | No | No | No | No |
| Fluid | Water | Water | Water | Water |
| Line Size | 150 mm | 150 mm | 150 mm | 150 mm |
| Type C Leakage Test | Yes | Yes | Yes | Yes |
| Pipe Length from Cont. to Inboard/Outboard Isolation Valve | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide |
| Leakage Through Packing[a] | (a1) | N/A | N/A | (a1) |
| Leakage Past Seat[b] | (b2) | (b2) | (b2) | (b2) |
| Location | Outboard | Inboard | Inboard | Outboard |
| Valve Type | ~~GB,~~ QBL~~T~~, GT | GB, QBL, AF~~T, GT~~ | GB, QBL, AF~~T, GT~~ | ~~GB,~~ QBL~~T~~, GT |
| Operator[c] | A~~S~~O | NO | NO | A~~S~~O |
| Normal Position | Open | Open | Open | Open |
| Shutdown Position | Open/Closed | Open/Closed | Open/Closed | Open/Closed |
| Post-Acc Position | Closed | Closed | Closed | Closed |
| Power Fail Position | Closed | Closed | Closed | Closed |
| Cont. Iso. Signal[d] | C,H | C,H | C,H | C,H |
| Primary Actuation | Automatic | Automatic | Automatic | Automatic |
| Secondary Actuation | Remote manual | Remote manual | Remote manual | Remote manual |

**Table 6.2-39**

**Containment Isolation Valve Information for the Chilled Water System Train A**

| Penetration Identification | P25-MPEN-0001 | | P25-MPEN-0002 | |
|---|---|---|---|---|
| Valve No. | F023A | F024A | F025A | F026A |
| Closure Time (sec.) | < 30 | < 30 | < 30 | < 30 |
| Power Source | Div. 2, 4 | Div. 1, 3 | Div. 1, 3 | Div. 2, 4 |

Note: For explanation of codes, see legend on Table 6.2-15.

**Table 6.2-39a**
**Containment Isolation Valve Information for the Chilled Water System Train B**

| Penetration Identification | P25-MPEN-0003 | | P25-MPEN-0004 | |
|---|---|---|---|---|
| Valve No. | F023B | F024B | F025B | F026B |
| Applicable Basis | GDC 56 | GDC 56 | GDC 56 | GDC 56 |
| Tier 2 Figure | 9.2-3 | 9.2-3 | 9.2-3 | 9.2-3 |
| ESF | No | No | No | No |
| Fluid | Water | Water | Water | Water |
| Line Size | 150 mm | 150 mm | 150 mm | 150 mm |
| Type C Leakage Test | Yes | Yes | Yes | Yes |
| Pipe Length from Cont. to Inboard/Outboard Isolation Valve | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide |
| Leakage Through Packing[a] | (a1) | N/A | N/A | (a1) |
| Leakage Past Seat[b] | (b2) | (b2) | (b2) | (b2) |
| Location | Outboard | Inboard | Inboard | Outboard |
| Valve Type | ~~GB~~, ~~QBLT~~, GT | ~~GB~~, ~~QBLT~~, GT | GB, QBL, ~~AFT~~, ~~GT~~ | ~~GB~~, ~~QBLT~~, GT |
| Operator[c] | ~~A~~SO | NO | NO | ~~A~~SO |
| Normal Position | Open | Open | Open | Open |
| Shutdown Position | Open/Closed | Open/Closed | Open/Closed | Open/Closed |
| Post-Acc Position | Closed | Closed | Closed | Closed |
| Power Fail Position | Closed | Closed | Closed | Closed |
| Cont. Iso. Signal[d] | C,H | C,H | C,H | C,H |
| Primary Actuation | Automatic | Automatic | Automatic | Automatic |
| Secondary Actuation | Remote manual | Remote manual | Remote manual | Remote manual |
| Closure Time (sec.) | < 30 | < 30 | < 30 | < 30 |
| Power Source | Div. 2, 4 | Div. 1, 3 | Div. 1, 3 | Div. 2, 4 |

Note: For explanation of codes, see legend on Table 6.2-15.

**Table 6.2-40**

**Containment Isolation Valve Information for the High Pressure Nitrogen Gas Supply System**

| Penetration Identification | P54-MPEN-0001 | | P54-MPEN-0002 | |
|---|---|---|---|---|
| Valve No. | F0026 | F027 | F009 | F010 |
| Applicable Basis | GDC 56 | GDC 56 | GDC 56 | GDC 56 |
| Tier 2 Figure | N/A | N/A | N/A | N/A |
| ESF | No | No | No | No |
| Fluid | Air/$N_2$ | Air/$N_2$ | $N_2$ | $N_2$ |
| Line Size | 50 mm | 50 mm | 50 mm | 50 mm |
| Type C Leakage Test | Yes | Yes | Yes | Yes |
| Pipe Length from Cont. to Inboard/Outboard Isolation Valve | COL holder to provide | COL holder to provide | COL holder to provide | COL holder to provide |
| Leakage Through Packing[a] | ($a_1$) | N/A | ($a_1$) | N/A |
| Leakage Past Seat[b] | ($b_2$) | ($b_2$) | ($b_2$) | ($b_2$) |
| Location | Outboard | Inboard | Outboard | Inboard |
| Valve Type | ~~GB, QT~~QBL, QBF | CK | ~~GB, QT~~QBL, QBF | CK |
| Operator[c] | AO | ~~PM~~SA | AO | ~~PM~~SA |
| Normal Position | Open | Open/Closed | Open | Open/Closed |
| Shutdown Position | Open/Closed | Open/Closed | Open/Closed | Open/Closed |
| Post-Acc Position | Closed | Closed | Closed | Closed |
| Power Fail Position | Closed | ~~Closed~~N/A | Closed | ~~Closed~~N/A |
| Cont. Iso. Signal[d] | C,H | Q | C,H | Q |
| Primary Actuation | Automatic | Automatic | Automatic | Automatic |
| Secondary Actuation | Remote manual | Process Actuated | Remote manual | Process Actuated |
| Closure Time (sec.) | < 30 | N/A | < 30 | N/A |
| Power Source | Div. 2, 4 | N/A | Div. 2, 4 | N/A |

**Table 6.2-40**

**Containment Isolation Valve Information for the High Pressure Nitrogen Gas Supply System**

| Penetration Identification | P54-MPEN-0001 | | P54-MPEN-0002 | |
|---|---|---|---|---|
| Valve No. | F0026 | F027 | F009 | F010 |

Note: For explanation of codes, see legend on Table 6.2-15.

**Table 6.2-41**

**Containment Isolation Valve Information for the Makeup Water System ~~(Not used)~~**

| Penetration Identification | P10-MPEN-0001 | |
|---|---|---|
| Valve No. | F016 | F015 |
| Applicable Basis | GDC 56 | GDC 56 |
| Tier 2 Figure | N/A | N/A |
| ESF | No | No |
| Fluid | Water | Water |
| Line Size | | |
| Type C Leakage Test | Yes | Yes |
| Pipe Length from Cont. to Inboard/Outboard Isolation Valve | COL Holder to provide | COL Holder to provide |
| Leakage Through Packing[a] | N/A | ($a_1$) |
| Leakage Past Seat[b] | ($b_5$) | ($b_5$) |
| Location | Inboard | Outboard |
| Valve Type | CK | GT, QBL |
| Operator[c] | SA | M |
| Normal Position | Closed | Closed |
| Shutdown Position | Closed | Closed |
| Post-Acc Position | Closed | Closed |
| Power Fail Position | N/A | N/A |
| Cont. Iso. Signal[d] | Q | R |
| Primary Actuation | Process actuated | Manual |
| Secondary Actuation | N/A | N/A |
| Closure Time (sec.) | N/A | N/A |
| Power Source | N/A | N/A |

**Table 6.2-42**

**Containment Isolation Valve Information for the Process Radiation Monitoring System**

| Penetration Identification | D11-MPEN-0001[41] | | D11-MPEN-0002[42] | |
|---|---|---|---|---|
| Valve No. | F001 | F002 | F003 | F004 |
| Applicable Basis | GDC 56 | GDC 56 | GDC 56 | GDC 56 |
| Tier 2 Figure | N/A | N/A | N/A | N/A |
| ESF | No | No | No | No |
| Fluid | Air/$N_2$ | Air/$N_2$ | Air/$N_2$ | Air/$N_2$ |
| Line Size | 25 mm | 25 mm | 25 mm | 25 mm |
| Type C Leakage Test | Yes | Yes | Yes | Yes |
| Pipe Length from Cont. to Inboard/Outboard Isolation Valve | See Sub-section 6.2.4.2 | See Sub-section 6.2.4.2 | See Sub-section 6.2.4.2 | See Sub-section 6.2.4.2 |
| Leakage Through Packing[(a)] | ($a_1$) | ($a_1$) | ($a_1$) | ($a_1$) |
| Leakage Past Seat[(b)] | ($b_2$) | ($b_2$) | ($b_2$) | ($b_2$) |
| Location | Outboard | Outboard | Outboard | Outboard |
| Valve Type | GB~~, QT~~ | GB~~, QT~~ | GB~~, QT~~ | GB~~, QT~~ |
| Operator[(c)] | SO | SO | SO | SO |
| Normal Position | Open | Open | Open | Open |
| Shutdown Position | Closed | Closed | Closed | Closed |
| Post-Acc Position | Closed | Closed | Closed | Closed |
| Power Fail Position | Closed | Closed | Closed | Closed |
| Cont. Iso. Signal[(d)] | C,H,T | C,H,T | C,H,T | C,H,T |
| Primary Actuation | Automatic | Automatic | Automatic | Automatic |
| Secondary Actuation | Remote | Remote | Remote | Remote |

[41] Valve F001 in series with F002.
[42] Valve F003 in series with F004.

**Table 6.2-42**

**Containment Isolation Valve Information for the Process Radiation Monitoring System**

| Penetration Identification | D11-MPEN-0001[41] | | D11-MPEN-0002[42] | |
|---|---|---|---|---|
| Valve No. | F001 | F002 | F003 | F004 |
| | manual | manual | manual | manual |
| Closure Time (sec.) | < 5 | < 5 | < 5 | < 5 |
| Power Source | Div. 2, 4 | Div. 1, 3 | Div. 2, 4 | Div. 1, 3 |

Note: For explanation of codes, see legend on Table 6.2-15.

**Table 6.2-43**

**Containment Isolation Valve Information for the Equipment and Floor Drain System ~~(Not used)~~**

| Penetration Identification | U50-MPEN-0001 | | U50-MPEN-0002 | |
|---|---|---|---|---|
| Valve No. | F | F | F | F |
| Applicable Basis | GDC 56 | GDC 56 | GDC 56 | GDC 56 |
| Tier 2 Figure | N/A | N/A | N/A | N/A |
| ESF | No | No | No | No |
| Fluid | Water | Water | Water | Water |
| Line Size | ≥ 50 mm | ≥ 50 mm | ≥ 50 mm | ≥ 50 mm |
| Type C Leakage Test | Yes | Yes | Yes | Yes |
| Pipe Length from Cont. to Inboard/Outboard Isolation Valve | COL Holder to provide | COL Holder to provide | COL Holder to provide | COL Holder to provide |
| Leakage Through Packing[a] | ($a_1$) | N/A | ($a_1$) | N/A |
| Leakage Past Seat[b] | ($b_7$) | ($b_7$) | ($b_7$) | ($b_7$) |
| Location | Outboard | Inboard | Outboard | Inboard |
| Valve Type | QBL, GB, AF | QBL, GT | QBL, GB, AF | QBL, GT |
| Operator[c] | NO | AO | NO | AO |
| Normal Position | Closed | Closed | Closed | Closed |
| Shutdown Position | Closed | Closed | Closed | Closed |
| Post-Acc Position | Closed | Closed | Closed | Closed |
| Power Fail Position | Closed | Closed | Closed | Closed |
| Cont. Iso. Signal[d] | B, C, H, S | B, C, H, S | B, C, H, V | B, C, H, V |
| Primary Actuation | Automatic | Automatic | Automatic | Automatic |
| Secondary Actuation | Remote manual | Remote manual | Remote manual | Remote manual |

**Table 6.2-43**

**Containment Isolation Valve Information for the Equipment and Floor Drain System ~~(Not used)~~**

| Penetration Identification | U50-MPEN-0001 | | U50-MPEN-0002 | |
|---|---|---|---|---|
| Valve No. | F | F | F | F |
| Closure Time (sec.) | ≤ 30 | ≤ 30 | ≤ 30 | ≤ 30 |
| Power Source | Div. 2, 4 | Div. 1, 3 | Div. 2, 4 | Div. 1, 3 |

~~Table 6.2-44~~

~~(Not used)~~

Table 6.2-44

**Containment Isolation Valve Information for the Service Air System**

| Penetration Identification | P51-MPEN-0001 | |
|---|---|---|
| Valve No. | F | F |
| Applicable Basis | GDC 56 | GDC 56 |
| Tier 2 Figure | N/A | N/A |
| ESF | No | No |
| Fluid | Air | Air |
| Line Size | | |
| Type C Leakage Test | Yes | Yes |
| Pipe Length from Cont. to Inboard/Outboard Isolation Valve | COL Holder to provide | COL Holder to provide |
| Leakage Through Packing[a] | ($a_1$) | N/A |
| Leakage Past Seat[b] | ($b_6$) | ($b_6$) |
| Location | Outboard | Inboard |
| Valve Type | QBL, GB | QBL, GB |
| Operator[c] | M | M |
| Normal Position | Closed | Closed |
| Shutdown Position | Open | Open |
| Post-Acc Position | Closed | Closed |
| Power Fail Position | N/A | N/A |
| Cont. Iso. Signal[d] | R | R |
| Primary Actuation | Manual | Manual |
| Secondary Actuation | N/A | N/A |

**Table 6.2-44**

**Containment Isolation Valve Information for the Service Air System**

| Penetration Identification | P51-MPEN-0001 | |
|---|---|---|
| Valve No. | F | F |
| Closure Time (sec.) | N/A | N/A |
| Power Source | N/A | N/A |

~~Table 6.2-45~~

~~(Not used)~~

Table 6.2-45

Containment Isolation Valve Information for the Containment Monitoring System

| Penetration Identification | T62-MPEN-TBD (8 penetrations) | |
|---|---|---|
| Valve No. | Various | Various |
| Applicable Basis | GDC 56 | GDC 56 |
| Tier 2 Figure | N/A | N/A |
| ESF | No | No |
| Fluid | Air/$N_2$ | Air/$N_2$ |
| Line Size | | |
| Type C Leakage Test | Yes | Yes |
| Pipe Length from Cont. to Inboard/Outboard Isolation Valve | COL Holder to provide | COL Holder to provide |
| Leakage Through Packing[a] | ($a_1$) | N/A |
| Leakage Past Seat[b] | ($b_1$) | ($b_2$) |
| Location | Outboard | Inboard |
| Valve Type | GB, QT | GB, QT |
| Operator[c] | SO, AO | SO, AO |
| Normal Position | Open | Open |
| Shutdown Position | Open | Open |
| Post-Acc Position | Open | Open |
| Power Fail Position | Open | Open |
| Cont. Iso. Signal[d] | B, C, H | B, C, H |
| Primary Actuation | Automatic | Automatic |
| Secondary Actuation | Remote manual | Remote manual |

**Table 6.2-45**

**Containment Isolation Valve Information for the Containment Monitoring System**

| Penetration Identification | T62-MPEN-TBD (8 penetrations) | |
|---|---|---|
| Valve No. | Various | Various |
| Closure Time (sec.) | ≤ 30 | ≤ 30 |
| Power Source | Div. 2, 4 | Div. 1, 3 |

**Table 6.2-47**

**Containment Penetrations Subject To Type A, B, and C Testing**

| Penetration Number (1) | Description | Location (3)/Room # | RCCV Sector | Penetration Type (4) | Leak Test Type (5) |
|---|---|---|---|---|---|
| **Piping Penetrations** | | | | | |
| **B21: Nuclear Boiler System (NBS)** | | | | | |
| B21-MPEN-0001 | Main Steam Line A | UD / ST | I | A | A, C |
| B21-MPEN-0002 | Main Steam Line B | UD / ST | I | A | A, C |
| B21-MPEN-0003 | Main Steam Line C | UD / ST | IV | A | A, C |
| B21-MPEN-0004 | Main Steam Line D | UD / ST | IV | A | A, C |
| B21-MPEN-0006 | Feedwater Line A | UD / ST | I | A | A, C |
| B21-MPEN-0007 | Feedwater Line B | UD / ST | IV | A | A, C |
| B21-MPEN-0005 | Main Steam Drain Header | UD /ST | TBD | A | A, C |
| B21-MPEN-TBD | RPV Water Level | UD | TBD | I | A, C |
| B21-MPEN-TBD | RPV Water Level | UD | TBD | I | A, C |
| B21-MPEN-TBD | RPV Water Level | UD | TBD | I | A, C |
| B21-MPEN-TBD | RPV Water Level | UD | TBD | I | A, C |
| B21-MPEN-TBD | RPV Water Level | UD | TBD | I | A, C |
| B21-MPEN-TBD | RPV Water Level | UD | TBD | I | A, C |
| B21-MPEN-TBD | RPV Water Level | UD | TBD | I | A, C |
| B21-MPEN-TBD | RPV Water Level | UD | TBD | I | A, C |
| B21-MPEN-TBD | RPV Water Level | LD | TBD | I | A, C |
| B21-MPEN-TBD | RPV Water Level | LD | TBD | I | A, C |
| B21-MPEN-TBD | RPV Water Level | LD | TBD | I | A, C |
| B21-MPEN-TBD | RPV Water Level | LD | TBD | I | A, C |
| B21-MPEN-TBD | RPV Water Level | LD | TBD | I | A, C |
| B21-MPEN-TBD | RPV Water Level | LD | TBD | I | A, C |
| B21-MPEN-TBD | RPV Water Level | LD | TBD | I | A, C |
| B21-MPEN-TBD | Main Steam Line A Flow Restrictor Instr Line 1 | UD | TBD | I | A, C |
| B21-MPEN-TBD | Main Steam Line A Flow Restrictor Instr Line 2 | UD | TBD | I | A, C |
| B21-MPEN-TBD | Main Steam Line B Flow Restrictor Instr Line 1 | UD | TBD | I | A, C |
| B21-MPEN-TBD | Main Steam Line B Flow Restrictor Instr Line 2 | UD | TBD | I | A, C |
| B21-MPEN-TBD | Main Steam Line C Flow Restrictor Instr Line 1 | UD | TBD | I | A, C |
| B21-MPEN-TBD | Main Steam Line C Flow Restrictor Instr Line 2 | UD | TBD | I | A, C |
| B21-MPEN-TBD | Main Steam Line D Flow Restrictor Instr Line 1 | UD | TBD | I | A, C |
| B21-MPEN-TBD | Main Steam Line D Flow Restrictor Instr Line 2 | UD | TBD | I | A, C |

**Table 6.2-47**

**Containment Penetrations Subject To Type A, B, and C Testing**

| Penetration Number (1) | Description | Location (3)/Room # | RCCV Sector | Penetration Type (4) | Leak Test Type (5) |
|---|---|---|---|---|---|
| B21-MPEN-TBD | Feedwater Line A Instrumentation | UD / ST | TBD | I | A, C |
| B21-MPEN-TBD | Feedwater Line B Instrumentation | UD / ST | TBD | I | A, C |
| B21-MPEN-TBD | RPV Flange Seal Leakage Monitor | UD / ST | TBD | I | A, C |
| B21-MPEN-TBD | RPV Top Head Vent Instrument Line | UD / ST | TBD | I | A, C |
| **B32: Isolation Condenser System (ICS)** | | | | | |
| B32-MPEN-0001 | Train A Steam Supply Line | TS | I | B | A, C |
| B32-MPEN-0017 | Train A Purge Line From Steam Supply Line | TS | I | B | A, C |
| B32-MPEN-0005 | Train A Condensate Return | TS | I | B | A, C |
| B32-MPEN-0009 | Train A Vent Line A From Upper Header (1CA) | TS | I | B | A, C |
| B32-MPEN-0013 | Train A Vent Line A From Lower Header (1CA) | TS | I | B | A, C |
| B32-MPEN-TBD | Train A Steam Line Flowrate Instrumentation | UD | I | I | A, C |
| B32-MPEN-TBD | Train A Steam Line Flowrate Instrumentation | UD | I | I | A, C |
| B32-MPEN-TBD | Train A Steam Line Flowrate Instrumentation | UD | I | I | A, C |
| B32-MPEN-TBD | Train A Steam Line Flowrate Instrumentation | UD | I | I | A, C |
| B32-MPEN-TBD | Train A Condensate Line Flowrate Instrumentation | UD | I | I | A, C |
| B32-MPEN-TBD | Train A Condensate Line Flowrate Instrumentation | UD | I | I | A, C |
| B32-MPEN-TBD | Train A Condensate Line Flowrate Instrumentation | UD | I | I | A, C |
| B32-MPEN-TBD | Train A Condensate Line Flowrate Instrumentation | UD | I | I | A, C |
| B32-MPEN-0002 | Train B Steam Supply Line | TS | III | B | A, C |
| B32-MPEN-0018 | Train B Purge Line From Steam Supply Line | TS | III | B | A, C |
| B32-MPEN-0006 | Train B Condensate Return | TS | III | B | A, C |
| B32-MPEN-0010 | Train B Vent Line A From Upper Header (1CB) | TS | III | B | A, C |
| B32-MPEN-0014 | Train B Vent line A From Lower Header (1CB) | TS | III | B | A, C |
| B32-MPEN-TBD | Train B Steam Line Flowrate Instrumentation | UD | III | I | A, C |

**Table 6.2-47**

**Containment Penetrations Subject To Type A, B, and C Testing**

| Penetration Number (1) | Description | Location (3)/Room # | RCCV Sector | Penetration Type (4) | Leak Test Type (5) |
|---|---|---|---|---|---|
| B32-MPEN-TBD | Train B Steam Line Flowrate Instrumentation | UD | III | I | A, C |
| B32-MPEN-TBD | Train B Steam Line Flowrate Instrumentation | UD | III | I | A, C |
| B32-MPEN-TBD | Train B Steam Line Flowrate Instrumentation | UD | III | I | A, C |
| B32-MPEN-TBD | Train B Condensate Line Flowrate Instrumentation | UD | III | I | A, C |
| B32-MPEN-TBD | Train B Condensate Line Flowrate Instrumentation | UD | III | I | A, C |
| B32-MPEN-TBD | Train B Condensate Line Flowrate Instrumentation | UD | III | I | A, C |
| B32-MPEN-TBD | Train B Condensate Line Flowrate Instrumentation | UD | III | I | A, C |
| B32-MPEN-0003 | Train C Steam Supply Line | TS | II | B | A, C |
| B32-MPEN-0019 | Train C Purge Line From Steam Supply Line | TS | II | B | A, C |
| B32-MPEN-0007 | Train C Condensate Return | TS | II | B | A, C |
| B32-MPEN-0011 | Train C Vent Line A From Upper Header (1CC) | TS | II | B | A, C |
| B32-MPEN-0015 | Train C Vent Line A From Lower Header (1CC) | TS | II | B | A, C |
| B32-MPEN-TBD | Train C Steam Line Flowrate Instrumentation | UD | II | I | A, C |
| B32-MPEN-TBD | Train C Steam Line Flowrate Instrumentation | UD | II | I | A, C |
| B32-MPEN-TBD | Train C Steam Line Flowrate Instrumentation | UD | II | I | A, C |
| B32-MPEN-TBD | Train C Steam Line Flowrate Instrumentation | UD | II | I | A, C |
| B32-MPEN-TBD | Train C Condensate Line Flowrate Instrumentation | UD | II | I | A, C |
| B32-MPEN-TBD | Train C Condensate Line Flowrate Instrumentation | UD | II | I | A, C |
| B32-MPEN-TBD | Train C Condensate Line Flowrate Instrumentation | UD | II | I | A, C |
| B32-MPEN-TBD | Train C Condensate Line Flowrate Instrumentation | UD | II | I | A, C |
| B32-MPEN-0004 | Train D Steam Supply Line | TS | IV | B | A, C |
| B32-MPEN-0020 | Train D Purge Line From Steam Supply Line | TS | IV | B | A, C |
| B32-MPEN-0008 | Train D Condensate Return | TS | IV | B | A, C |
| B32-MPEN-0012 | Train D Vent Line A From Upper Header (1CD) | TS | IV | B | A, C |

**Table 6.2-47**

**Containment Penetrations Subject To Type A, B, and C Testing**

| Penetration Number (1) | Description | Location (3)/Room # | RCCV Sector | Penetration Type (4) | Leak Test Type (5) |
|---|---|---|---|---|---|
| B32-MPEN-0016 | Train D Vent Line A From Lower Header (1CD) | TS | IV | B | A, C |
| B32-MPEN-TBD | Train D Steam Line Flowrate Instrumentation | UD | IV | I | A, C |
| B32-MPEN-TBD | Train D Steam Line Flowrate Instrumentation | UD | IV | I | A, C |
| B32-MPEN-TBD | Train D Steam Line Flowrate Instrumentation | UD | IV | I | A, C |
| B32-MPEN-TBD | Train D Steam Line Flowrate Instrumentation | UD | IV | I | A, C |
| B32-MPEN-TBD | Train D Condensate Line Flowrate Instrumentation | UD | IV | I | A, C |
| B32-MPEN-TBD | Train D Condensate Line Flowrate Instrumentation | UD | IV | I | A, C |
| B32-MPEN-TBD | Train D Condensate Line Flowrate Instrumentation | UD | IV | I | A, C |
| B32-MPEN-TBD | Train D Condensate Line Flowrate Instrumentation | UD | IV | I | A, C |
| **C12: Fine Motion Control Rod Drive System (FMCRDS)** | | | | | |
| C12-MPEN-TBD | FMCRD: 23 Hydraulic Lines (2) | LD/1110 | I | M | A |
| C12-MPEN-TBD | FMCRD: 22 Hydraulic Lines (2) + 1 SPARE | LD/1110 | I | M | A |
| C12-MPEN-TBD | FMCRD: 22 Hydraulic Lines (2) + 1 SPARE | LD/1110 | I | M | A |
| C12-MPEN-TBD | FMCRD: 23 Hydraulic Lines (2) | LD/1120 | II | M | A |
| C12-MPEN-TBD | FMCRD: 23 Hydraulic Lines (2) | LD/1120 | II | M | A |
| C12-MPEN-TBD | FMCRD: 22 Hydraulic Lines (2) + 1 SPARE | LD/1120 | II | M | A |
| C12-MPEN-TBD | FMCRD: 23 Hydraulic Lines (2) | LD/1130 | III | M | A |
| C12-MPEN-TBD | FMCRD: 22 Hydraulic Lines (2) + 1 SPARE | LD/1130 | III | M | A |
| C12-MPEN-TBD | FMCRD: 22 Hydraulic Lines (2) + 1 SPARE | LD/1130 | III | M | A |
| C12-MPEN-TBD | FMCRD: 23 Hydraulic Lines (2) | LD/1140 | IV | M | A |
| C12-MPEN-TBD | FMCRD: 22 Hydraulic Lines (2) + 1 SPARE | LD/1140 | IV | M | A |
| C12-MPEN-TBD | FMCRD: 22 Hydraulic Lines (2) + 1 SPARE | LD/1140 | IV | M | A |
| **C41: Standby Liquid Control System (SLCS)** | | | | | |
| C41-MPEN-0001 | Borated Liquid Injection (Train A) | UD | TBD | B | A, C |
| C41-MPEN-0002 | Borated Liquid Injection (Train B) | UD | TBD | B | A, C |

**Table 6.2-47**

**Containment Penetrations Subject To Type A, B, and C Testing**

| Penetration Number (1) | Description | Location (3)/Room # | RCCV Sector | Penetration Type (4) | Leak Test Type (5) |
|---|---|---|---|---|---|
| **D11: Process Radiation Monitoring System (PRMS)** | | | | | |
| D11-MPEN-0001 | Fission Product Rad Monitoring Extraction Line | UD | TBD | I | A, C |
| D11-MPEN-0002 | Fission Product Rad Monitoring Return Line | UD | TBD | I | A, C |
| **E50: Gravity Driven Cooling System (GDCS)** | | | | | |
| E50-MPEN-TBD | GDCS Pool A Water Level | UD | TBD | I | A, C |
| E50-MPEN-TBD | GDCS Pool A Water Level | UD | TBD | I | A, C |
| E50-MPEN-TBD | GDCS Pool B/C Water Level | UD | TBD | I | A, C |
| E50-MPEN-TBD | GDCS Pool B/C Water Level | UD | TBD | I | A, C |
| E50-MPEN-TBD | GDCS Pool D Water Level | UD | TBD | I | A, C |
| E50-MPEN-TBD | GDCS Pool D Water Level | UD | TBD | I | A, C |
| **G21: Fuel and Auxiliary Pools Cooling System (FAPCS)** | | | | | |
| G21-MPEN-0001 | Drywell Spray Discharge Line | UD | TBD | C | A, C |
| G21-MPEN-0002 | Suppression Pool Return Line A | UD | TBD | C | A, C |
| G21-MPEN-0003 | GDCS Pool Return Line | UD | TBD | C | A, C |
| G21-MPEN-0004 | Suction Line from GDCS Pool | UD | TBD | C | A, C |
| G21-MPEN-0005 | Suction Line A from Suppression Pool | LD | TBD | C | A, C |
| G21-MPEN-0006 | Suppression Pool Return Line B | UD | TBD | C | A, C |
| G21-MPEN-0007 | Suction Line B from Suppression Pool | LD | TBD | C | A, C |
| G21-MPEN-0008~~TBD~~ | Reactor Well Drain Line | TS | TBD | C | A, C |
| **G31: Reactor Water Cleanup and Shutdown Cooling System (RWCU/SDCS)** | | | | | |
| G31-MPEN-0001 | RPV Mid-Vessel Line (Train A) | LD | TBD | A | A, C |
| G31-MPEN-0002 | RPV Mid-Vessel Line (Train B) | LD | TBD | A | A, C |
| G31-MPEN-0003 | RPV Bottom Drain Line (Train A) | LD | TBD | B | A, C |
| G31-MPEN-0004 | RPV Bottom Drain Line (Train B) | LD | TBD | B | A, C |
| G31-MPEN-0005 | Sample Line (Train A) | LD | TBD | B | A, C |
| G31-MPEN-0006 | Sample Line (Train B) | LD | TBD | B | A, C |
| **P10: Makeup Water System (MWS)** | | | | | |
| P10-MPEN-0001 | Demin Water Drywell Distribution | TBD | TBD | C | A, C |
| **P25: Chilled Water System (CWS)** | | | | | |
| P25-MPEN-0001 | CWS Supply Line Train A | UD | TBD | B | A, C |
| P25-MPEN-0003 | CWS Supply Line Train B | UD | TBD | B | A, C |
| P25-MPEN-0002 | CWS Return Line Train A | UD | TBD | B | A, C |
| P25-MPEN-0004 | CWS Return Line Train B | UD | TBD | B | A, C |
| **P51: Service Air System (SAS)** | | | | | |
| P51-MPEN-0001~~TBD~~ | Service Air Supply | UD | TBD | C | A, C |

**Table 6.2-47**

**Containment Penetrations Subject To Type A, B, and C Testing**

| Penetration Number (1) | Description | Location (3)/Room # | RCCV Sector | Penetration Type (4) | Leak Test Type (5) |
|---|---|---|---|---|---|
| ~~P51-MPEN-TBD~~ | ~~Breathing Air Supply~~ | ~~UD~~ | ~~TBD~~ | ~~C~~ | ~~A~~ |
| **P54: High Pressure Nitrogen Supply System (HPNSS)** | | | | | |
| P54-MPEN-0001 | Supply to MSIV Accumulators | UD | TBD | B | A, C |
| P54-MPEN-0002 | Supply to ADS and ICIV Accumulators | UD | TBD | B | A, C |
| **T11: Containment Vessel: Equipment & Personnel Access Hatches** | | | | | |
| T11-SPEN-TBD | LD Equipment Hatch | LD/1206 | II/III | Hatch | A, B |
| T11-SPEN-TBD | LD Personnel Airlock | LD /1205 | I/IV | Air Lock | A, B |
| T11-SPEN-TBD | Wetwell Access Hatch | WA/1600 | III | Hatch | A, B |
| T11-SPEN-TBD | UD Equipment Hatch | UD /1740 | IV | Hatch | A, B |
| T11-SPEN-TBD | UD Personnel Airlock | UD/1710 | I | Air Lock | A, B |
| T11: Containment Vessel: Temporary Services During Outages & Spare Penetrations | | | | | |
| T11-MPEN-TBD | Temporary Services During Outages | LD | TBD | TBD | A, B |
| T11-MPEN-TBD | Temporary Services During Outages | LD | TBD | TBD | A, B |
| T11-MPEN-TBD | Temporary Services During Outages | UD | TBD | TBD | A, B |
| T11-MPEN-TBD | Temporary Services During Outages | UD | TBD | TBD | A, B |
| T11-MPEN-TBD | Temporary Services During Outages | WA | III | TBD | A, B |
| T11-MPEN-TBD | Spare Mechanical Penetration [penetration is capped] | TBD | TBD | S | A |
| T11-MPEN-TBD | Spare Mechanical Penetration [penetration is capped] | TBD | TBD | S | A |
| T11-MPEN-TBD | Spare Mechanical Penetration [penetration is capped] | TBD | TBD | S | A |
| T11-EPEN-TBD | Spare Electrical Penetration | TBD | I | E | A, B |
| T11-EPEN-TBD | Spare Electrical Penetration | TBD | II | E | A, B |
| T11-EPEN-TBD | Spare Electrical Penetration | TBD | III | E | A, B |
| T11-EPEN-TBD | Spare Electrical Penetration | TBD | IV | E | A, B |
| T11-EPEN-TBD | Spare Electrical Penetration | TBD | I | E | A, B |
| T11-EPEN-TBD | Spare Electrical Penetration | TBD | II | E | A, B |
| T11-EPEN-TBD | Spare Electrical Penetration | TBD | III | E | A, B |
| T11-EPEN-TBD | Spare Electrical Penetration | TBD | IV | E | A, B |
| ~~T15: Passive Containment Cooling System (PCCS)~~ | | | | | |
| ~~T15-MPEN-0001~~ | ~~Condenser Steam Inlet Line A (6)~~ | ~~TS~~ | ~~I~~ | ~~B~~ | ~~A~~ |
| ~~T15-MPEN-0007~~ | ~~Condenser Condensate + Vent Line A1 (6)~~ | ~~TS~~ | ~~I~~ | ~~B~~ | ~~A~~ |
| ~~T15-MPEN-0008~~ | ~~Condenser Condensate + Vent Line A2 (6)~~ | ~~TS~~ | ~~I~~ | ~~B~~ | ~~A~~ |

**Table 6.2-47**

**Containment Penetrations Subject To Type A, B, and C Testing**

| Penetration Number (1) | Description | Location (3)/Room # | RCCV Sector | Penetration Type (4) | Leak Test Type (5) |
|---|---|---|---|---|---|
| ~~T15-MPEN-0002~~ | ~~Condenser Steam Inlet Line B~~ | ~~TS~~ | ~~I/III~~ | ~~B~~ | ~~A~~ |
| ~~T15-MPEN-0009~~ | ~~Condenser Condensate + Vent Line B1~~ | ~~TS~~ | ~~I/III~~ | ~~B~~ | ~~A~~ |
| ~~T15-MPEN-0010~~ | ~~Condenser Condensate + Vent Line B2~~ | ~~TS~~ | ~~I/III~~ | ~~B~~ | ~~A~~ |
| ~~T15-MPEN-0003~~ | ~~Condenser Steam Inlet Line C (6)~~ | ~~TS~~ | ~~III~~ | ~~B~~ | ~~A~~ |
| ~~T15-MPEN-0011~~ | ~~Condenser Condensate + Vent Line C1 (6)~~ | ~~TS~~ | ~~III~~ | ~~B~~ | ~~A~~ |
| ~~T15-MPEN-0012~~ | ~~Condenser Condensate + Vent Line C2 (6)~~ | ~~TS~~ | ~~III~~ | ~~B~~ | ~~A~~ |
| ~~T15-MPEN-0004~~ | ~~Condenser Steam Inlet Line D~~ | ~~TS~~ | ~~II~~ | ~~B~~ | ~~A~~ |
| ~~T15-MPEN-0013~~ | ~~Condenser Condensate + Vent Line D1~~ | ~~TS~~ | ~~II~~ | ~~B~~ | ~~A~~ |
| ~~T15-MPEN-0014~~ | ~~Condenser Condensate + Vent Line D2~~ | ~~TS~~ | ~~II~~ | ~~B~~ | ~~A~~ |
| ~~T15-MPEN-0005~~ | ~~Condenser Steam Inlet Line E~~ | ~~TS~~ | ~~II/IV~~ | ~~B~~ | ~~A~~ |
| ~~T15-MPEN-0015~~ | ~~Condenser Condensate + Vent Line E1~~ | ~~TS~~ | ~~II/IV~~ | ~~B~~ | ~~A~~ |
| ~~T15-MPEN-0016~~ | ~~Condenser Condensate + Vent Line E2~~ | ~~TS~~ | ~~II/IV~~ | ~~B~~ | ~~A~~ |
| ~~T15-MPEN-0006~~ | ~~Condenser Steam Inlet Line F~~ | ~~TS~~ | ~~IV~~ | ~~B~~ | ~~A~~ |
| ~~T15-MPEN-0017~~ | ~~Condenser Condensate + Vent Line F1~~ | ~~TS~~ | ~~IV~~ | ~~B~~ | ~~A~~ |
| ~~T15-MPEN-0018~~ | ~~Condenser Condensate + Vent Line F2~~ | ~~TS~~ | ~~IV~~ | ~~B~~ | ~~A~~ |
| **T31: Containment Inerting System (CIS)** | | | | | |
| T31-MPEN-0001 | Upper Drywell Injection Line | UD | TBD | C | A, C |
| T31-MPEN-0002 | Suppression Pool Airspace Injection Line | WA | TBD | C | A, C |
| T31-MPEN-0003 | Main Exhaust Line (Lower Drywell) | LD | TBD | C | A, C |
| T31-MPEN-0004 | Second Exhaust Line (Suppression Pool Airspace) | UD | TBD | C | A, C |
| ~~T31-MPEN-TBD~~ | ~~Containment Pressure Test (GDCS Pool)~~ | ~~UW~~ | ~~TBD~~ | ~~C~~ | ~~A~~ |
| T31-MPEN-TBD | Containment Pressure Test (Lower Drywell) [penetration is capped] | WA | TBD | C | A |
| **T62: Containment Monitoring System (CMS)** | | | | | |
| T62-MPEN-TBD | H2-O2 & Drywell Gas Sample Line From Upper Drywell (Loop A) | UD | TBD | C | A, C |

**Table 6.2-47**

**Containment Penetrations Subject To Type A, B, and C Testing**

| Penetration Number (1) | Description | Location (3)/Room # | RCCV Sector | Penetration Type (4) | Leak Test Type (5) |
|---|---|---|---|---|---|
| T62-MPEN-TBD | H2-O2 & Drywell Gas Sample Return Line to Upper Drywell (Loop A) | UD | TBD | C | A, C |
| T62-MPEN-TBD | H2-O2 & Drywell Gas Sample Line From Wetwell Airspace (Loop A) | WA | TBD | C | A, C |
| T62-MPEN-TBD | H2-O2 & Drywell Gas Sample Return Line to Wetwell Airspace (Loop A) | WA | TBD | C | A, C |
| T62-MPEN-TBD | H2-O2 & Drywell Gas Sample Line From Upper Drywell (Loop B) | UD | TBD | C | A, C |
| T62-MPEN-TBD | H2-O2 & Drywell Gas Sample Return Line to Upper Drywell (Loop B) | UD | TBD | C | A, C |
| T62-MPEN-TBD | H2-O2 & Wetwell Gas Sample Line From Wetwell Airspace (Loop B) | WA | TBD | C | A, C |
| T62-MPEN-TBD | H2-O2 & Wetwell Gas Sample Return Line to Wetwell Airspace (Loop B) | WA | TBD | C | A, C |
| T62-MPEN-TBD | Suppression Pool Water Level Monitoring-Wide Range | WP | TBD | I | A, C |
| T62-MPEN-TBD | Suppression Pool Water Level Monitoring-Wide Range | WP | TBD | I | A, C |
| T62-MPEN-TBD | Suppression Pool Water Level Monitoring-Wide Range | WP | TBD | I | A, C |
| T62-MPEN-TBD | Suppression Pool Water Level Monitoring-Wide Range | WP | TBD | I | A, C |
| T62-MPEN-TBD | Suppression Pool Water Level Monitoring-Narrow Range | WP | TBD | I | A, C |
| T62-MPEN-TBD | Suppression Pool Water Level Monitoring-Narrow Range | WP | TBD | I | A, C |
| T62-MPEN-TBD | Suppression Pool Water Level Monitoring-Narrow Range | WP | TBD | I | A, C |
| T62-MPEN-TBD | Suppression Pool Water Level Monitoring-Narrow Range | WP | TBD | I | A, C |
| T62-MPEN-TBD | Drywell Pressure Monitoring-Wide Range (Post-Accident Monitoring) | UD | TBD | I | A, C |
| T62-MPEN-TBD | Drywell Pressure Monitoring-Wide Range (Post-Accident Monitoring) | UD | TBD | I | A, C |

**Table 6.2-47**

**Containment Penetrations Subject To Type A, B, and C Testing**

| Penetration Number (1) | Description | Location (3)/Room # | RCCV Sector | Penetration Type (4) | Leak Test Type (5) |
|---|---|---|---|---|---|
| T62-MPEN-TBD | Drywell Pressure Monitoring-Wide Range (Diverse Protection System) | UD | TBD | I | A, C |
| T62-MPEN-TBD | Drywell Pressure Monitoring-Wide Range (Diverse Protection System) | UD | TBD | I | A, C |
| T62-MPEN-TBD | Drywell Pressure Monitoring-Wide Range (Diverse Protection System) | UD | TBD | I | A, C |
| T62-MPEN-TBD | Drywell Pressure Monitoring-Wide Range (Diverse Protection System) | UD | TBD | I | A, C |
| T62-MPEN-TBD | Drywell Pressure Monitoring – Narrow Range | UD | TBD | I | A, C |
| T62-MPEN-TBD | Drywell Pressure Monitoring – Narrow Range | UD | TBD | I | A, C |
| T62-MPEN-TBD | Drywell Pressure Monitoring – Narrow Range | UD | TBD | I | A, C |
| T62-MPEN-TBD | Drywell Pressure Monitoring – Narrow Range | UD | TBD | I | A, C |
| T62-MPEN-TBD | Wetwell Vapor Pressure Monitoring | WA | TBD | I | A, C |
| T62-MPEN-TBD | Wetwell Vapor Pressure Monitoring | WA | TBD | I | A, C |
| T62-MPEN-TBD | Drywell/Wetwell Differential Pressure Monitoring (UD ) | UD | TBD | I | A, C |
| T62-MPEN-TBD | Drywell/Wetwell Differential Pressure Monitoring (WA ) | WA | TBD | I | A, C |
| T62-MPEN-TBD | Drywell/Wetwell Differential Pressure Monitoring (LD ) | LD | TBD | I | A, C |
| T62-MPEN-TBD | Drywell/Wetwell Differential Pressure Monitoring (WA ) | WA | TBD | I | A, C |
| T62-MPEN-TBD | Lower Drywell Post-LOCA Water Level Monitoring Line A | LD | TBD | I | A, C |
| T62-MPEN-TBD | Lower Drywell Post-LOCA Water Level Monitoring Line B | LD | TBD | I | A, C |
| T62-MPEN-TBD | Upper Drywell Post-LOCA Water Level Monitoring Line A | LD | TBD | I | A, C |
| T62-MPEN-TBD | Upper Drywell Post-LOCA Water Level Monitoring Line B | LD | TBD | I | A, C |
| **U50: Equipment and Floor Drain System (EFDS)** | | | | | |
| U50-MPEN-0001~~TBD~~ | Drywell LCW Sump Discharge Line (3) | LD | TBD | B | A, C |

**Table 6.2-47**

**Containment Penetrations Subject To Type A, B, and C Testing**

| Penetration Number (1) | Description | Location (3)/Room # | RCCV Sector | Penetration Type (4) | Leak Test Type (5) |
|---|---|---|---|---|---|
| U50-MPEN-0002~~TBD~~ | Drywell HCW Sump Discharge Line (3) | LD | TBD | B | A, C |
| Electrical Penetrations | | | | | |
| **R31: Raceway System** | | | | | |
| R31-EPEN-TBD | Div 1 Electrical Penetration | LD /1312 | I | E | A, B |
| R31-EPEN-TBD | Non-Div Electrical Penetration | LD /1300 | I | E | A, B |
| R31-EPEN-TBD | Non-Div Electrical Penetration | LD /1300 | I | E | A, B |
| R31-EPEN-TBD | Div 2 Electrical Penetration | LD /1322 | II | E | A, B |
| R31-EPEN-TBD | Non-Div Electrical Penetration | LD/1302 | II | E | A, B |
| R31-EPEN-TBD | Non-Div Electrical Penetration | LD/1302 | II | E | A, B |
| R31-EPEN-TBD | Div 3 Electrical Penetration | LD /1332 | III | E | A, B |
| R31-EPEN-TBD | Non-Div Electrical Penetration | LD/1301 | III | E | A, B |
| R31-EPEN-TBD | Non-Div Electrical Penetration | LD/1301 | III | E | A, B |
| R31-EPEN-TBD | Div 4 Electrical Penetration | LD /1342 | IV | E | A, B |
| R31-EPEN-TBD | Non-Div Electrical Penetration | LD/1303 | IV | E | A, B |
| R31-EPEN-TBD | Non-Div Electrical Penetration | LD/1303 | IV | E | A, B |
| R31-EPEN-TBD | Non-Div Electrical Penetration | WP/1600 | I | E | A, B |
| R31-EPEN-TBD | Div 1 Electrical Penetration | WP/1610 | I | E | A, B |
| R31-EPEN-TBD | Non-Div Electrical Penetration | WP/1600 | II | E | A, B |
| R31-EPEN-TBD | Electrical Penetration | WP/1600 | II | E | A, B |
| R31-EPEN-TBD | Div 2 Electrical Penetration | WP/1620 | II | E | A, B |
| R31-EPEN-TBD | Non-Div Electrical Penetration | WP/1600 | III | E | A, B |
| R31-EPEN-TBD | Non-Div Electrical Penetration | WP/1600 | III | E | A, B |
| R31-EPEN-TBD | Div 3 Electrical Penetration | WP/1630 | III | E | A, B |
| R31-EPEN-TBD | Non-Div Electrical Penetration | WP/1600 | IV | E | A, B |
| R31-EPEN-TBD | Div 4 Electrical Penetration | WP/1640 | IV | E | A, B |
| R31-EPEN-TBD | Div 1 Electrical Penetration | UD/1711 | I | E | A, B |
| R31-EPEN-TBD | Div 1 Electrical Penetration | UD/1711 | I | E | A, B |
| R31-EPEN-TBD | Div 2 Electrical Penetration | UD/1721 | II | E | A, B |
| R31-EPEN-TBD | Div 2 Electrical Penetration | UD/1721 | II | E | A, B |
| R31-EPEN-TBD | Div 3 Electrical Penetration | UD/1731 | III | E | A, B |
| R31-EPEN-TBD | Div 3 Electrical Penetration | UD/1731 | III | E | A, B |
| R31-EPEN-TBD | Div 4 Electrical Penetration | UD/1741 | IV | E | A, B |
| R31-EPEN-TBD | Div 4 Electrical Penetration | UD/1741 | IV | E | A, B |

Notes:

(1) Penetration numbering:
EPEN = Electrical Penetrations
MPEN = Mechanical penetrations
SPEN = Structural penetration, Hatch, Equip or Personnel

(2) Estimation is based on 269 FMCRD hydraulic lines and 12 sleeves

(3) UD – UPPER DRYWELL
ST – STEAM TUNNEL
TS – TOP SLAB

LD – LOWER DRYWELL
WA – WETWELL AIRSPACE
WP – WETWELL POOL
TBD - TO BE DETERMINED
HCW - HIGH CONDUCTIVITY WASTE
LCW - LOW CONDUCTIVITY WASTE

(4) Penetration type:
Type A = Penetration with thermal sleeve for High Energy Pipelines; (Main Steam & Feed Water Lines) (Fig. 3.8-6)
Type B = Penetration with thermal sleeve for Low / High Energy Flow (DCD, Rev.3 Fig. 3.8-6 and 3.8-7)
Type C = Embedded penetration without thermal sleeve (Cold Type for flow Tmax<93°C(200°F)) (Fig. 3.8-8)
Type E = Penetration with flanges (Electrical, Maintenance, etc) (Fig. 3.8-10)
Type I = Instrumentation and Radiation Monitoring. (TBD)
Type M = Multiple penetration with sleeve (Fig. 3.8-9)
Type S = Spare Mechanical Penetration (TBD)

(5) All penetrations will be subject to the Type A, Integrated Leak Rate Test (ILRT)
All penetrations excluded from Type B testing are welded penetrations and do not include any resilient seals in their design.

(6) PCCS Pool designations are subject to change