Airlock Door

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            Quality Assurance Manager
            Oct. 20. 2003

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             CEO
             Oct. 20. 2003
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A1.0 Regarding to the Proposal

We hereby guarantee that the equipment to be supplied hereunder is new and of a proven design. We further guarantee that the proposed work to be performed by us is in full compliance with the requirements of Investor’s invitation to bid documents including its amendment/addenda.

The bidder shall take no exception or deviation to Investor’s invitation to bid documents in its proposal. Violation to this requirement will cause Investor to request the bidder’s withdrawal of the exception/deviation or to reject and disqualify the bidder’s proposal at Investor’s sole discretion.

In addition to that, we certify that we have several experiences in design and fabricating for Airlock Doors in projects of Korea Atomic Energy Research Institute and the Korean national Veterinary Research Institute. This is far better than Investor’s requirements.

A1.1 Codes and Standards

As the airlock rooms and airlock doors separate radiation control areas and non-control areas, they shall be designed so as to satisfy functions of the entrance control and the negative pressure control.

There are two types of airlock doors, manually operated and electrically operated.

The final applicable Regulations, industrial Codes and Standards will consist of the following:

<table>
<thead>
<tr>
<th>U.S. Code of Federal Regulations(CFR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>*10 CFR21 1996 Reporting of Defects and Noncompliance</td>
</tr>
<tr>
<td>*10 CFR50.55 1996 Domestic Licensing of Production and Utilization Facilities Conditions of Construction Permits</td>
</tr>
<tr>
<td>*10 CFR73.2 1996 Physical Protection of Plants and Materials Definitions</td>
</tr>
<tr>
<td>*10 CFR73.55 1996 Requirements for Physical Protection of Licensed Activities in Nuclear Power Reactors against Radiological Sabotage</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>American National Standards Institute(ANSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSI/ANS58.3 Physical Protection for Nuclear Safety-Related Systems and Components IMP</td>
</tr>
<tr>
<td>ANSI/UL752 Bullet-Resisting Equipment</td>
</tr>
<tr>
<td>AWS D1.1 1990 Structural Welding Code-Steel</td>
</tr>
</tbody>
</table>
**Airlock Door**

<table>
<thead>
<tr>
<th>Regulation/Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>AWS D1.3</em></td>
<td>Structural Welding Code-Sheet Steel</td>
</tr>
<tr>
<td><strong>Crane Manufacturer’s Association of America</strong></td>
<td></td>
</tr>
<tr>
<td>CMAA70</td>
<td>Specifications for Top Running Bridge and Gantry Type Multiple Girder Electric Operating Overhead Cranes</td>
</tr>
<tr>
<td><strong>National Fire Protection Agency (NEPA)</strong></td>
<td></td>
</tr>
<tr>
<td><em>NEPA70</em></td>
<td>National Electrical Code (NEC)</td>
</tr>
<tr>
<td><strong>Underwriters Laboratories Inc. (UL)</strong></td>
<td></td>
</tr>
<tr>
<td>UL10B</td>
<td>Standard for Fire Tests of Door Assemblies</td>
</tr>
<tr>
<td><strong>Structural Steel Painting Council (SSPC)</strong></td>
<td></td>
</tr>
<tr>
<td><em>SSPCPA1</em></td>
<td>1972 Shop, Field &amp; Maintenance Painting</td>
</tr>
<tr>
<td>SSPCSP2</td>
<td>Hand Tool Cleaning</td>
</tr>
<tr>
<td><em>SSPCSP10</em></td>
<td>1985 Near-White Blast Cleaning</td>
</tr>
<tr>
<td><strong>US Nuclear Regulatory Commission</strong></td>
<td></td>
</tr>
<tr>
<td><em>RG1.28, Rev.3</em></td>
<td>Quality Assurance Requirements for Nuclear Facility Applications Section IX Welding and Brazing Qualifications</td>
</tr>
<tr>
<td><strong>Institute for Electrical and Electronic Engineers</strong></td>
<td></td>
</tr>
<tr>
<td><em>IEEE-344</em></td>
<td>1987 Recommended Practice for Seismic Qualifications of Class 1E Equipment for Nuclear Power Generating Stations</td>
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<tr>
<td><em>IEEE323</em></td>
<td>1974 Qualifying Class 1E Equipment for Nuclear Generating Stations</td>
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<td><strong>American Society for Testing and Materials (ASTM)</strong></td>
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<tr>
<td>ASTM A36/A36M</td>
<td>Specification for Carbon Structural Steel</td>
</tr>
<tr>
<td>ASTM A108</td>
<td>Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality</td>
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<tr>
<td>ASTM A167</td>
<td>Specification for Stainless and Heat-Resisting Chromium-Nickel Steel plate, Sheet, and Strip</td>
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<td>ASTM A666</td>
<td>Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar</td>
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<tr>
<td>ASTM A283/A283M</td>
<td>Specification for Low and Intermediate Tensile Strength Carbon Steel Plates</td>
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<tr>
<td>ASTM D412</td>
<td>Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension</td>
</tr>
<tr>
<td>ASTM D1056</td>
<td>Specification for Flexible Cellular Materials Sponge or Expanded Rubber</td>
</tr>
<tr>
<td>ASTM D1149</td>
<td>Test Method for Rubber Deterioration Surface Ozone Cracking in a Chamber</td>
</tr>
<tr>
<td>ASTM D1415</td>
<td>Test Method for Rubber Property-International Hardness</td>
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</tbody>
</table>
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<table>
<thead>
<tr>
<th>ASTM D2240</th>
<th>Test Method for Rubber Property-Durometer Hardness</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM D3395</td>
<td>Test Method for Rubber Deterioration-Dynamic Ozone Cracking in a Chamber</td>
</tr>
</tbody>
</table>

**Iron and Steel Society Inc. (ISS)**

| ISS 209 | Steel Bar Product Guide Line |
| ISS 212 | ISS Steel Products Manual: Plates; Rolled Floor Plates; Carbon; High Strength Low Alloy; and Alloy Steel |

**Military Standards (MIL)**

| MIL-T-152B | Treatment, Moisture- and Fungus-Resistant, of Communications, Electronic, and Associated Electrical Equipment |
| MIL-V-173C | Varnish, Moisture and Fungus Resistant (For Treatment of Communications, Electronic, and Associated Equipment) |

### A.1.2 Furnished by the Purchaser

The Purchaser will provide:

A) Unloading, storage, and erection services.
B) Operational and load (Field performance test) testing after installation.
C) Furnishing and installing embedded plates, anchor bolts, templates
And temporary support for installing special doors except the embedded plates and studs for Electrically Operated Sliding Radiation on Shielding Doors, where Investor requires the Supplier to furnish embedded plates, studs, rails and guide rails which will be installed by Purchaser under the supervision and acceptance of the technical assigned by Supplier.

### A.1.3 Furnished by the Supplier

Suppliers must provide the door required for installment of Electric Single Sliding Doors for Personnel Airlock and Doors for Large Component Entrance Airlock Doors, all employees, equipment and managers.
Also, whether mentioned or not, contractor would provide other hardware materials and equipments to test and install the supplying material of contractor.

### A.1.4 Functional Requirements

### A.1.4.1 Electric Single Sliding Doors for Personnel Airlock
Airlock doors are personnel doors that are installed in the airlock room on the border of the Building.

As the airlock rooms and airlock doors separate radiation control areas and non-control areas, they shall be designed so as to satisfy functions of the entrance control and the negative pressure control.

There are two types of airlock doors, manually operated and electrically operated. The airlock doors between the ROOM shall be electrical doors, as workers frequently pass through them. The airlock doors of the Large Component Entrance Building shall be manual doors, as there are few passers-by.

The doors shall be hanger type sliding doors and the driving device shall be installed on the walls above the door openings. The opening and closing speed of the door shall be provided with a door position switch and a lock position switch alarm system to send a signal to remote indicating lights in the main control room. They shall be designed and fabricated to conform to the requirements of quality, airtight and interlock system and seismic requirements, which are stated in Design Requirements.

A.1.4.2 Doors for Large Component Entrance Airlock
Component airlock doors, Type I, II and III are part of airlock doors installed in the Large Component Entrance Building, and are used to bring in equipment.
Airlock Door

They shall be controlled to open and close by interlock system. Figure 1 shows the locations of each type of door, the control panel for the interlock system and operation boards for type I, and II doors.

Figure 1   Location of Doors in Large Component Entrance Airlock

A.1.4.2.1 Electrically Tightened Double Swinging Pressure Resistant Door (Type I Door)

The door shall be electrically operated hinged door and shall equip an emergency door. The door shall be operated by a push button on the front of the control panel and the operation board.
The door shall not opened when the other doors, Type II and III doors, are opened. The opening and closing speed of door shall be between 3.5 m/min and 5.0 m/min. Enclosed sensor switches shall be installed to prevent further movement of the door when the door is fully open or closed.
The door shall be capable of being manually operated in case there are problems with the driving devices.
Each door shall be provided with a door position switch and a lock position switch to give a signal for remote indicating lights in the main control room.
The door shall be designed and fabricated to conform to the requirements of quality, airtight, interlock system, pressure resisting and seismic requirement, which are stated in Design Requirements.
Airlock Door

Its dimensions are shown in as following(Appendix A90):

**Conditions of Large Component Entrance Airlock(Appendix A90)**

This section defines the requirements of Large Component Entrance Airlock for the equipment/materials purchased under this specification.

(per UNIT)

<table>
<thead>
<tr>
<th>Type I Door</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door No.</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>Type-I</td>
</tr>
</tbody>
</table>

**A.1.4.2.2 Manually Tightened Double Swinging Airtight Door (Type II Door)**

The door shall be operated by a push button for the electrical interlock system on the operation board which installed on a inner wall adjacent to the door when the other doors, Type I and III doors, are closed. The door shall not be opened from the outside.

The door shall be manually operated hinged doors, and shall be opened by hand wheel or lever handle from the inside only.

Each door shall be provided with a door position switch and a lock position switch to give a signal for remote indicating lights in the main control room.

The door shall be designed and fabricated to conform to the requirements of quality, missile resisting, airtight, interlock system and seismic requirement, which are stated in Design Requirements.

Its dimensions are shown in as following(Appendix A90):

**Conditions of Large Component Entrance Airlock(Appendix A90)**

This section defines the requirements of Large Component Entrance Airlock for the equipment/materials purchased under this specification.
Airlock Door

(per UNIT)

Type II Door

<table>
<thead>
<tr>
<th>Door No.</th>
<th>EL No.</th>
<th>Room No.</th>
<th>Required pressure for resisting (kg/m²)</th>
<th>Height (mm)</th>
<th>operation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type-II</td>
<td>12300</td>
<td></td>
<td>5,000</td>
<td>5,300</td>
<td>Manual</td>
<td>Fire rated, Missile Resisting, Interlock</td>
</tr>
</tbody>
</table>
A.1.4.2.3 Personnel Door (Type III Door)

The door shall be quick acting, manually operated hinged doors, and shall be operable by hand wheel or lever handle from the inside only. The door shall not be operated from the outside. The door shall not be operated without a signal for opening from the main control room in the CB except in an emergency. In an emergency, the door shall be opened with a push button equipped on the internal surface of the door. Each door shall be provided with a door position switch and a lock position switch to give a signal for remote indicating lights in the main control room. The door shall be designed and fabricated to conform to the requirements of quality, missile resisting, airtight, interlock system and seismic requirements, which are stated in Design Requirements.

Its dimensions are shown in as following (Appendix A90):

**Conditions of Large Component Entrance Airlock (Appendix A90)**

This section defines the requirements of Large Component Entrance Airlock for the equipment/materials purchased under this specification.

(per UNIT)

**Type III Door**

<table>
<thead>
<tr>
<th>Door No.</th>
<th>EL</th>
<th>Room No.</th>
<th>Required pressure for resisting(kg/m²)</th>
<th>Height (mm)</th>
<th>operation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type-III</td>
<td>12300</td>
<td></td>
<td>1,000</td>
<td>2,100</td>
<td>Manual</td>
<td>Fire rated, Missile Resisting, Interlock</td>
</tr>
</tbody>
</table>
A.1.4.3 Fire Rate

The door including door frame and hardware shall be fabricated in accordance with the requirements of, and shall bear and label of, Underwriters’ Laboratories for the class of 3-hr fire rating except for fire rated oversized doors. These doors shall have door assemblies made of fire resistant material that will not contribute to flame spread in accordance with NFPA 80 and NFPA 252 Standards. This includes the steel door panel, steel frame construction, hinges, a lock or latch, a closing device, the internal insulation, and the gasket material.

These oversized doors shall be built in accordance with the Underwrites Laboratories label procedure for oversized construction and shall be certified by the Supplier that the oversized doors were manufactured in compliance, except for size, to the requirements for the same class and type of doors fire tested by UL or equivalent.
Airlock Door

by the Supplier with an oversized certificate and it shall be built in accordance with
the Underwriters Laboratories label procedure for oversized construction.
This requirement holds for fire rate doors in A40, A50, A60, A70, A90 and A120.
One–hr Fire Rate Window shall be glazed glass conforming to the requirements of
Underwriter’s Laboratories for the class of 1–hr fire rating.
The window shall have window assemblies made of fire resistant material that will not
contribute to flame spread in accordance with NFPA 80 and NFPA 257 standards.

A.1.4.4 Tropicalization

Tropicalization shall be in accordance with as following(Appendix A100,
Section A100.4.1.)

Tropicalization

Due to the humid subtropical climate zone of the Owner's project
site, painting and coating of all equipment(herein to include
combined equipment assemblies or subassemblies, components,
and materials) shall be "tropicalized" to protect the equipment from
the growth of fungus.

The following climatological parameters are applicable to the project
site:

<table>
<thead>
<tr>
<th></th>
<th>Maximum</th>
<th>Minimum</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>37.9 °C (100°F)</td>
<td>3.4 °C (38°F)</td>
<td>21.7 °C (71°F)</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>100 percent</td>
<td>32 percent</td>
<td>83 percent</td>
</tr>
</tbody>
</table>

Other climate conditions unique to this project include severe salt laden air and rain fall, frequent
typhoons, and winds.

Application of tropicalization preventives and varnishes shall be done according to
the requirements of MIL-T-152B and MIL-V173C.
Application of the varnishes shall not interfere with the operation or performance of the equipment.

Equipment treatment is intended to accomplish the following:

1. Impart non-wet-ability to surfaces.
2. Retard the absorption of moisture.
3. Inhibit the growth of fungi.

Non-nutrient materials (non-fungus supporting) need not be treated.

Each treated unit of equipment, and equipment that is inherently tropicalized due to its materials of construction and the containers in which it has been packaged for shipment, shall be permanently marked with the words TROPICALIZED.

### A.1.5 Design Requirements

#### A. Quality Classification

Electric single sliding doors for personnel airlock, and doors in Large Component Entrance Airlock shall be Classified as Quality Class “R”.

#### B. Seismic and Dynamic Classification

Electric single sliding doors for personnel airlock, and doors in Large Component Entrance Airlock shall be Classified as Seismic Category “IIA”. The entire seismic grade conducted below this page is the first grade. Seismic and Dynamic conditions is designed according to the followings.

### Seismic and Dynamic Conditions (Appendix A30)

<table>
<thead>
<tr>
<th>Code</th>
<th>Code Title</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSI N45.2</td>
<td>Quality Assurance Program Requirements for Nuclear Power Plants</td>
<td>1977</td>
</tr>
<tr>
<td>ANSI N45.2.11</td>
<td>Quality Assurance Requirements for the design of Nuclear Power Plants</td>
<td>1974</td>
</tr>
</tbody>
</table>
### Quality Assurance Requirements

<table>
<thead>
<tr>
<th><strong>Document</strong></th>
<th><strong>Title</strong></th>
<th><strong>Year</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSI N45.2.13</td>
<td>Quality Assurance Requirements for the control of Procurement of Items and Services for Nuclear Power Plants</td>
<td>1976</td>
</tr>
<tr>
<td>ASME NQA-2</td>
<td>Quality Assurance Requirements for Nuclear Power Plants</td>
<td>1989</td>
</tr>
<tr>
<td>IEEE 308</td>
<td>Criteria for Class IE Equipment for Nuclear Power Generating Stations</td>
<td>1991</td>
</tr>
<tr>
<td>IEEE 323</td>
<td>Standard for Qualifying Class IE Equipment for Nuclear Generating Stations.</td>
<td>1983</td>
</tr>
<tr>
<td>NRC1.61 Rev.0</td>
<td>Damping Values for Seismic Design of Nuclear Power Plants</td>
<td>1973</td>
</tr>
<tr>
<td>NRC1.89 Rev.1</td>
<td>Qualification of Class IE Equipment for Nuclear Power Plant</td>
<td>1984</td>
</tr>
<tr>
<td>NRC1.92 Rev.1</td>
<td>Combining Modal Response and Spatial Components in Seismic Response Analysis</td>
<td>1976</td>
</tr>
</tbody>
</table>

**Class IE Equipment**: Electrical equipment that meets the definition of safety-related and is essential to safety shutdown of the nuclear reactor and for preventing significant release of radioactive material to the environment.

**Critical Damping**: The least amount of viscous damping that will cause a single degree-of-freedom system to return to its original position without oscillation after initial disturbance.

**Dynamic System**: Individual equipment or an assembly of equipment or structural elements which, when excited, exhibits natural frequency of vibration.

**Natural Frequencies**: Free vibration frequencies of an elastic dynamic system.
Fundamental Frequency: The lowest natural frequency of a dynamic system.

Cutoff Frequency: The frequency in the response spectrum where the Zero Period Acceleration (ZPA) asymptote begins to flatten out. This is the frequency above which the single degree of freedom oscillators exhibit no amplification of the input motion.

Operating Basis Earthquake (OBE): An earthquake that could reasonably be expected to occur at the plant site during the operating life of the plant.

Safe Shutdown Earthquake (SSE): An earthquake that produces the maximum vibratory ground motion for which certain structures, systems, and components important to safety are designed to remain functional to enable the nuclear station to achieve and maintain the reactor in a shutdown condition.

Hydrodynamic Loads: Vibratory loads that are imposed on equipment due to building vibrations resulting from the actuation of and discharge of main system through the Safety Relief Valve (SRV), and Loss Of Coolant Accidents (LOCA) or high energy line breaks.

Dynamic Loads: Those vibratory loads containing seismic loads (OBE and SSE) and hydrodynamic loads (SRV and LOCA) impose on the plant and equipment and from the requirements for design and qualification.

Type Test: Tests made on one or more sample products to verify adequacy of design and the manufacturing process.

A.30.4 Structural Requirements

The method of qualification shall employ a static method or a static equivalent method. Testing and other methods acceptable to the Purchaser may also be used which shall be submitted to the Purchaser for approval with the Proposal. Documentation shall clearly justify the choice of method(s) used.

Static analysis shall be used for rigid equipment, where ZPA loads shall be applied to the equipment center of mass.

The results of qualification shall demonstrate continued structural integrity of the mechanical components when subjected to the required loading.
A.30.5 Functional Requirements

Active mechanical components are additionally required to be functionally qualified for all applicable loading.

The seller shall identify what operation each active mechanical component is expected to perform and when its safety-related function is required. Seller shall identify whether the component must function during or after any design basis event(s), or both in addition to normal operation. Functional qualification shall prove that the effect of earthquakes and other loads will not cause the equipment to fail to perform its safety-related function.

Functional qualification applies only to the active mechanical components.

Functional qualification shall be initiated with a review of potential failure modes postulated to result from design basis seismic and, if applicable, hydrodynamic loads. The method of functional qualification shall involve documented experience, analysis, testing, or a combination of these methods.

A.30.5.1 Experience Functional Qualification

Experience qualification of function is based on the similarity of the equipment in comparison to other equipment already qualified to the same or higher seismic and dynamic loads.

A.30.5.2 Analysis Functional Qualification

Function qualification by analysis shall demonstrate that the postulated failure for active mechanical equipment involving overstress, loss of alignment, or unacceptable distortion in moving parts will not occur under the required loading.

These strain dependent failure modes can be evaluated by analysis in which the calculated stresses, loads, and deformations are compared with explicitly stated limits of acceptance criteria. Qualification by analysis involves the choice of a static, static equivalent, or dynamic analysis method.

A.30.5.3 Testing Functional Qualification

Testing functional qualification shall include an in-situ(exploratory)test and/or a laboratory shake table test. The supplier shall conduct dynamic verification tests for the special doors to be used. When the verification tests have been conducted under the similar conditions to the present project in terms of, for example, door size seismic intensity, etc., the supplier may submit to Purchaser documents on the test method, analysis method, their results, and the application for release of the test for this project.
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A.30.6 Absolute Accelerations

a. RB

<table>
<thead>
<tr>
<th>Floor Level</th>
<th>EW(g)</th>
<th>NS(g)</th>
<th>Horizontal Design Acceleration(g)</th>
<th>Vertical Design Acceleration(g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>38.2 – 49.7</td>
<td>1.80</td>
<td>1.73</td>
<td>1.80</td>
<td>1.22</td>
</tr>
<tr>
<td>31.7 – 38.2</td>
<td>1.34</td>
<td>1.25</td>
<td>1.34</td>
<td>0.96</td>
</tr>
<tr>
<td>23.5 – 31.7</td>
<td>1.16</td>
<td>0.95</td>
<td>1.16</td>
<td>0.82</td>
</tr>
<tr>
<td>18.1 – 23.5</td>
<td>0.84</td>
<td>0.82</td>
<td>0.84</td>
<td>0.66</td>
</tr>
<tr>
<td>12.3 – 18.1</td>
<td>0.70</td>
<td>0.74</td>
<td>0.74</td>
<td>0.55</td>
</tr>
<tr>
<td>4.8 – 12.3</td>
<td>0.57</td>
<td>0.64</td>
<td>0.64</td>
<td>0.49</td>
</tr>
<tr>
<td>-1.7 – 4.8</td>
<td>0.45</td>
<td>0.45</td>
<td>0.45</td>
<td>0.44</td>
</tr>
<tr>
<td>-8.2 – 1.7</td>
<td>0.39</td>
<td>0.41</td>
<td>0.41</td>
<td>0.42</td>
</tr>
</tbody>
</table>

Absolute Accelerations for the OBE of RB

<table>
<thead>
<tr>
<th>Floor Level</th>
<th>EW(g)</th>
<th>NS(g)</th>
<th>Horizontal Design Acceleration(g)</th>
<th>Vertical Design Acceleration(g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>38.2 – 49.7</td>
<td>1.06</td>
<td>1.12</td>
<td>1.12</td>
<td>0.65</td>
</tr>
<tr>
<td>31.7 – 38.2</td>
<td>0.86</td>
<td>0.72</td>
<td>0.86</td>
<td>0.52</td>
</tr>
<tr>
<td>23.5 – 31.7</td>
<td>0.66</td>
<td>0.60</td>
<td>0.66</td>
<td>0.46</td>
</tr>
<tr>
<td>18.1 – 23.5</td>
<td>0.49</td>
<td>0.46</td>
<td>0.49</td>
<td>0.37</td>
</tr>
<tr>
<td>12.3 – 18.1</td>
<td>0.36</td>
<td>0.39</td>
<td>0.39</td>
<td>0.31</td>
</tr>
<tr>
<td>4.8 – 12.3</td>
<td>0.33</td>
<td>0.32</td>
<td>0.33</td>
<td>0.27</td>
</tr>
<tr>
<td>-1.7 – 4.8</td>
<td>0.23</td>
<td>0.24</td>
<td>0.24</td>
<td>0.22</td>
</tr>
</tbody>
</table>

C. Airtight

Doors for airlock shall not exceed the allowable stress under a test pressure of the design shown in Appendix A70.
Amount of water leakage shall be less than $0.1 \, \text{m}^3/\text{hr}$ during test except the Type I and Type II Large Component Entrance Airlock Doors.

Amount of leakage shall be less than $0.1 \, \text{m}^3/\text{hr}$ during test for the Type I and Type II Large Component Entrance Airlock Doors.

Qualification of the doors shall be performed by the air–leak test stated in Testing Criteria.

**Airtight Conditions of Airlock Door for Personnel** (Appendix A70)

This section defines the airtight requirements for the equipment/materials purchased under this specification.

<table>
<thead>
<tr>
<th>Door No.</th>
<th>EL</th>
<th>Pressure (P.P.$^1$) (kg/m$^2$)</th>
<th>Pressure (N.P.$^2$) (kg/m$^2$)</th>
<th>Wall Opening Width (mm)</th>
<th>Wall Opening Height (mm)</th>
<th>Type</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARD–01</td>
<td>12300</td>
<td>900</td>
<td>300</td>
<td>1000</td>
<td>2100</td>
<td>Sliding</td>
<td>Fire rated</td>
</tr>
</tbody>
</table>

* $1 : $P.P.S$ means an abridgment of “Positive Pressure Side”.
* $2 : $N.P.S$ means an abridgment of “Negative Pressure Side”.

P.P.S and N.P.S are shown in Fig. A70–1.

![Figure A70-1](image-url)
D. Interlock System

Doors for airlock shall be performed in accordance with the requirements specified in Appendix A80. Qualification of the doors shall be performed by the operational test report stated in Shop Assembly and Operational Test.

Interlock System(Appendix A80)

This section defines the interlock system requirements for the equipment/materials purchased under this specification.

This system refers to an electrically controlled mechanism which prevents the doors at either end of an airlock room from being opened simultaneously. The system shall fulfill the following conditions.

1. One electrical control panel for moving and controlling the doors shall be installed for two or more doors that require an interlocking system.

2. A light indicating "INTERLOCKED" shall be lit when the interlock is activated to show that the door cannot be opened even if the "OPEN DOOR PUSH BUTTON" is pressed while the "OTHER DOOR OPEN INDICATOR" is lit.

3. If the key switch is operated to release the interlock, the "INTERLOCKED LIGHT" will be turned off and both doors A and B can be opened or closed simultaneously.

4. Interlock devices shall be such that they allow manual opening and closing during a blackout or other such event.

5. Pressure equalizing device shall be installed inside and outside the Airlock room to equalize differences in pressure if required.

6. In case personnel are confined in the airlock room, an emergency air vent shall be provided to ventilate the room if required.
Airlock Door

E. Pressure Resisting

Pressure Resisting door shall not exceed the allowable stress under a test pressure of the design load shown in Appendix A90.
Qualification of the doors shall be performed by the analysis or LS-DYNA.

F. Electrical Requirements

The Supplier shall supply and coordinate the design and selection of motors, resistors, controls, and associated elements of the electrical system.

All required transformers, rectifiers, protective disconnects, circuit breakers, electrical distribution and controls shall be provided.

All equipment shall be designed for continuous operation between 90% and 110% of specified voltage and between 95% and 105% of specified frequency.

The rotating parts shall continue to be operable if the voltage fluctuates by ± 10% and the frequency by ± 5%.

G. Wiring

Wire, cable, conduit, and fittings shall be installed and connected prior to shipment except where required to be disconnected for shipping.
All wires shall be identified at shipping splices.

Wiring shall be continuous between terminals. Splices shall not be permitted.

Each control wire shall be identified at its terminal with the wire designation corresponding to the wire number shown on the Supplier’s wiring diagram.

Spare terminals equal in number to 20% of the active terminals shall be provided.

Wiring shall be installed in moisture-tight, zinc-coated, rigid steel conduit, continuous between switches, junction boxes, motor, and panels.

Flexible connections may be provided between conduit and equipment when necessary.
H. Design Life

Except for items subject to wear in normal usage, all equipment, components, and materials shall have a useful design life of 40 years, accounting for corrosion, erosion, and material degradation. All the parts must have durability in order not to be changed within at least 48 months.

I. Typhoon Resisting

Typhoon Resisting qualification of doors shall be performed by the Analysis or LS-DYNS withstand extreme wind stated as following (Appendix 20).

(All doors required Typhoon Resisting shall be designed to resist and remain operational after Typhoon)

Environmental Conditions

This appendix identifies the environmental for the equipment/materials purchased under this specification.

1. Air Temperature

3.4℃ (38.1℉) to 37.9℃ (100.2℉)

2. Humidity

<table>
<thead>
<tr>
<th></th>
<th>Max</th>
<th>Min</th>
<th>Avg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>37.9℃ (100.2℉)</td>
<td>3.4℃ (38.1℉)</td>
<td>21.7℃ (71℉)</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>100%</td>
<td>32%</td>
<td>83%</td>
</tr>
</tbody>
</table>

3. Design Wind

The ABWR plant is designed to withstand the 194.4km/hr (normal) and 252km/hr (extreme) wind speeds.

Doors facing outside shall be designed to resist the force of 252km/hr wind speed.

4. Other climate conditions unique to this subtropical region such as severe salt laden air and rain fall, frequent typhoon, dusty wind, etc.
A.1.6 Structure

A.1.6.1 Electric Single Sliding Doors for Personnel Airlock

A. Door:
The doors shall be not less than 80 mm thick, full flush formed from stainless steel plates meeting ASTM A 666, type 316, minimum 1.5 mm (16 gauge) thick. The door edges shall be closed with receded channel and shall have no defects in air-tightness. The internal stiffeners shall be designed to withstand pressure and shall be welded to face plates. The door shall be equipped with a window. The size and location of the window are shown in the design drawing. The supplier shall provide all information required to furnish and install these materials.

B. Frame
The door frames shall be welded structures fabricated from solid or L-shape stainless steel angle meeting ASTM A 666, type 316, and shall have no defects in air tightness. The door frames shall be designed and fabricated to withstand seismic forces and the concrete pouring load. The door frames shall be equipped with studs designed to withstand seismic load. The studs shall be designed and fabricated removable. Location of studs shall be designed not to interfere with rebar. Rebar location will be informed by the Purchaser. The door frames and sills shall be equipped with gaskets conforming to the requirement identified in Materials Requirements.

When the door frame cannot resist the concrete pouring load, the Supplier shall provide a technical method for supporting the door frame.

C. Glass
Windows shall be glazed on both the inside and the outside of the door. The glass shall be clear and shall conform to the requirements of fire resistant. The installation and materials of setting block, sealing and other materials shall be SAMHOON’s standard.

D. Guide Rail
A guide rail shall be installed on the wall above the door opening. The guide rail shall be designed to withstand seismic forces and to assure of semi-air tightness. The guide rail shall be welded to embedded plates. Investor requires the Supplier to furnish embedded plates, studs and rails which will be installed by the Purchaser under supervision and acceptance of the technician assigned by Supplier.
Airlock Door

E. Guide Rail
A guide rail shall be installed on the wall above the door opening.
The guide rail shall be designed to withstand seismic forces and to assure of semi–air tightness.
The guide rail shall be welded to embedded plates. 
Investor requires the Supplier to furnish embedded plates, studs and rails which will be installed by the Purchaser under supervision and acceptance of the technician assigned by Supplier.

The Supplier shall inform the Purchaser of all requirements regarding embedded plates including studs.
If liner plates are required to keep tolerance, they shall be furnished by the Purchaser.
The Supplier shall provide all information required to furnish and install these materials.

F. Mergency Air Vent
The door shall have an emergency air vent which consist of steel pipe and steel screw cap.
The screw cap shall be set at the end of the pipe in the airlock room.
The location of screw cap shall be installed on a position operated easily in an emergency.
The air vent can be installed in the wall adjacent to the door instead of installing in the door.

G. Alarm System
Alarm System shall be provided to Electric single sliding doors for personnel airlock and doors for the large component entrance airlock.
Alarm system including switches, junction boxes, conduit and wiring shall be furnished by the Supplier.
Alarm system shall be qualified in accordance with IEEE Std 323 and shall remain functional after the imposition of seismic effect.
These doors shall be provided with a door position switch and a lock position switch to give a signal for remote indicating lights.
The position switch shall send a signal to an indicator in site security computer.
The alarm signal shall be given when the door is not in the closed position, and/or the locking pins are not engaged.
H. Driving device
The driving device shall consist of a motor, a torque limiter, a hanger etc.
The driving device shall be designed to be mounted on the top or both the top and a side of the door.

The opening and closing speed of the door shall be 0.2 m/sec to 0.4m/sec.

The motor control circuits shall designed to protect the motor from fluctuations in the power supply.

The doors shall be capable of being manually operated by rotating a handle in case there are problems with the driving devices which prevent both doors from being opened at the same due to electric interlocking.
If electric power is lost, electric interlocks shall be released.

The driving device shall be provided with a cover made of minimum 1.5 mm (16 gauge) stainless steel plates meeting ASTM A 666, type 316.
The cover shall be opened without a key.

I. Control Device
An electric control panel shall be installed on both the inside and outside of the wall adjacent to each door to control the operating and closing operations and the interlock system.
The panel shall contain the electrical parts needed to move and control the door, and have push buttons on the front of the cover plate for opening and closing the door and have provisions for a permissive signal from the plant security system to enable opening of the door.

The control panel shall be equipped with a terminal for indicating damaged door on the disaster-prevention panel in the main control room.

The front of the panel shall be provided with push buttons for “OPEN”, “CLOSE” and “STOP” and indicator lights.

The control device shall be provided with a cover made of minimum 1.5mm (16 gauge) stainless steel plates meeting ASTM A 666, type 316.
The cover shall be equipped with a key-operated lock.
J. Power Supply For alarm system
The power supply for system shall be taken from a terminal box installed on an inner wall adjacent to the door except manually tightened double swinging airtight door (type II door) and personnel door (type III door). The power supply for the alarm of type II and III doors shall be taken from the control panel installed on an adjacent wall.

The type of power supply is as follows:

<table>
<thead>
<tr>
<th>Type</th>
<th>Voltage</th>
<th>Frequency (Hz)</th>
<th>Phase</th>
<th>Amps</th>
</tr>
</thead>
<tbody>
<tr>
<td>D.C.</td>
<td>24</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

K. Power Supply For driving and control device
Operating current for driving device and control shall be taken from a control installed on an adjacent wall.

The type of power supply is as follows:

<table>
<thead>
<tr>
<th>Type</th>
<th>Volt</th>
<th>Frequency (Hz)</th>
<th>Phase</th>
<th>Power</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.C.</td>
<td>480</td>
<td>60</td>
<td>3</td>
<td>2.0 KVA</td>
<td>for driving device</td>
</tr>
<tr>
<td>A.C.</td>
<td>120</td>
<td>60</td>
<td>1</td>
<td>0.5 KVA</td>
<td>for interlock system</td>
</tr>
</tbody>
</table>

L. Embedded Plates(Stud, Bolts, and enc)
Embedded plates shall be installed in advance for bottom rail and guide rail. And the embedded plates is installed structure with welding stud. This is applicable items of Industrial property in Korea, which is we hold it.
1.6.2 Doors for the Large Component Entrance Airlock

1.6.2.1 Electrically Tightened Double Swinging Pressure Resistant Door (Type I Door)

A. Door

The doors shall be a welded structure fabricated of full flush formed from stainless steel plates meeting ASTM A 666, type 316, and shall have no defects in pressure resistant. The door assemblies shall withstand a test pressure of the design load with leakage of no more than 0.01 m³/hr and without exceeding the allowable stress in the materials. Each door leaf shall be provided with one motor of sufficient capacity to operate the door leaf and shall be designed to operate manually with a removable hand wheel when the door driving device has an accident.

B. Frame

The doors shall be a welded structure fabricated from stainless steel plates or L-shaped stainless steel angles and shall be no defects in pressure resistant. Stainless steel shall be ASTM A 666, type 316. The door frames shall be designed and fabricated to withstand seismic forces and the concrete pouring load. When the door frame cannot resist the concrete pouring load, the Supplier shall provide a technical method for supporting the door frame. The door frame shall be equipped with studs designed to withstand seismic forces. Position of studs shall be designed not to interfere with rebar which location will be informed by the Purchaser. The door frame and sill shall be equipped with gasket conforming to the requirements identified in Materials Requirements. The door sill shall not be equipped with studs. The door sill shall be welded to embedded steel plates or to steel plates welded to embedded plates installed by the Purchaser. The Supplier shall provide all information required to furnish and install these materials. The receptacle of eccentric cam shall be welded to the upper frame and sill.

The receptacle shall be made of stainless steel.
C. Hardware

a. Latch and Locks
The tightening mechanism shall be designed to insert the eccentric cam on the body into the receptacle on the frame.
The mechanism shall be operated from a control panel installed on a wall adjacent to the door.
The mechanism shall not be operable from either inside or outside the door when locked and shall be functional only when unlocked.
Tightening devices shall be sufficient to withstand seismic and pressure forces when the door is closed.
The mechanism shall be capable of being manually operated by rotating handle in case there are problems with the driving mechanisms which prevent both doors from being opened at the same time due to electric interlocking.

b. Hinges
The number and strength of hinges shall be decided taking into account seismic and air pressure forces.
Their surface shall be stainless steel meeting ASTM A 666, type 316.
The hinges shall be a type which has bearings and it shall be possible to run cables through one of them.

c. Pull handles
The pull handles shall be made of stainless steel meeting ASTM A 666, type 316, and shall be installed with the center line of the handle 1,000 mm above the interior furnished floor.
The handles shall be installed on both the inside and the outside.

d. Doors Stops
The doors stops shall consist of stainless steel plate, pipe and neoprene rubber and shall be fastened to the wall with expansion bolts.
The door stops shall be designed to be strong enough to withstand any impulsive force during door opening.

The angle of rotation shall be greater than 90 degrees to assure sufficient opening.
Door stops shall be designed and fabricated after deciding the opening angle.
When a door opening of 180 degrees is difficult to achieve, due to many piping interference around the door frame, the shape of the door stops shall be designed and fabricated for a minimum of 90 degree opening.
The opening angle shall be notified by the Purchaser.
D. Alarm System

Alarm System shall be provided to Electric single sliding doors for personnel airlock and doors for the large component entrance airlock. Alarm system including switches, junction boxes, conduit and wiring shall be furnished by the Supplier. Alarm system shall be qualified in accordance with IEEE Std 323 and shall remain functional after the imposition of seismic effect. These doors shall be provided with a door position switch and a lock position switch to give a signal for remote indicating lights. The position switch shall send a signal to an indicator in site security computer. The alarm signal shall be given when the door is not in the closed position, and/or the locking pins are not engaged.

E. Driving device

The driving device shall consist of a motor, a torque limiter, etc., and shall be mounted on the bottom of each door frame. The driving motor shall be equipped with a load sensing mechanism. If the door comes in contact with an object, the power to the drive shall be cut off.

The motor control circuits shall be designed to protect the motor from fluctuations in the power supply.

The opening and closing speed of the door shall be between 3.5 m/min and 5.0 m/min.

Enclosed sensor switches shall be installed to prevent further movement of the door when the door is fully open or closed.

The door shall be capable of being manually operated by rotating a handle in case there are problems with the driving devices which prevent both doors from being opened at the same time due to electric interlocking.

The driving device shall be provided with covers made of minimum 1.5 mm (16 gauge) stainless steel plates meeting ASTM A 666, type 316. The cover shall be opened without a key.
F. Control Device

The locations of the control panel and the operation board, which control the opening and closing operations and the interlock system,

The panel shall contain the electrical parts need to move and control the door, with push buttons, “OPEN”, “CLOSE” and “STOP”, on the front of the cover for opening and closing operations.

The panel shall have provisions for a permissive signal from the plant security system to enable opening of the door.

The panel shall be equipped with indicator lights on the front, which indicate the positions of opening or closing of type II and III doors.

The control panel shall be equipped with a terminal for indicating a damaged door on the disaster-prevention panel in the main control room.

If electric power is lost, the electric interlocks shall be released.

The control device shall be provided with a cover made from minimum 1.5mm (16 gauge) steel plates. The cover shall be equipped with a key-operated lock.

G. Power Supply For alarm system

The power supply for system shall be taken from a terminal box installed on an inner wall adjacent to thee door except manually tightened double swinging airtight door (type II door) and personnel door (type III door).

The power supply for the alarm of type II and III doors shall be taken from the control panel installed on an wall adjacent to type I door.

The type of power supply is as follows:

<table>
<thead>
<tr>
<th>Type</th>
<th>Voltage</th>
<th>Frequency (Hz)</th>
<th>Phase</th>
<th>Amps</th>
</tr>
</thead>
<tbody>
<tr>
<td>D.C.</td>
<td>24</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
H. Power Supply

For driving and control device

Operating current for driving device and control shall be taken from a control installed on an adjacent wall.

The type of power supply is as follows:

<table>
<thead>
<tr>
<th>Type</th>
<th>Volt</th>
<th>Frequency (Hz)</th>
<th>Phase</th>
<th>Power</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.C.</td>
<td>480</td>
<td>60</td>
<td>3</td>
<td>3.0 KVA</td>
<td>for driving device</td>
</tr>
</tbody>
</table>

I. Embedded Plates (Stud, Bolts, and etc)

Embedded plates is not prescribed specially. The type of installing door frame in advance is to be applicable.

1.6.2.2 Manually Tightened Double Swinging Airtight Door (Type II Door)

A. Door

The door shall be a full flush formed from stainless steel plates meeting ASTM A 666, type 316L, and shall have no defects in air-tightness.
The door shall be designed and fabricated to withstand seismic and typhoon missiles.
The door shall have air voids packed solid with UL labeled insulation.
The door assemblies shall assure the value of air-tightness without loss of the airtight seal and without exceeding the allowable stress in the materials.

B. Frame

The doors shall be a welded structure fabricated of solid stainless plate or L-shaped stainless steel angle and shall have defects in air-tightening. Stainless steel shall be ASTM A 666, type 316L.
The door frame shall be designed and fabricated to withstand seismic and typhoon forces, and the concrete pouring load.
When the door frame cannot resist the concrete pouring load, the Supplier shall provide a technical for supporting the door frame.
Airlock Door

The door frame shall be equipped with studs designed to withstand seismic forces. Position of studs shall be designed not to interfere with rebar which location will be informed by the Purchaser.

The door frame and sill shall be equipped with gasket conforming to the requirements identified in Fabrication Requirements.

The door shall not be equipped with stud.

The door sill shall be welded to embedded steel plates or to steel plates welded to embedded plates installed by the Purchaser.

The embedded plates shall be furnished by the Supplier.

The Supplier shall provide all information required to furnish and install these materials.

The receptacle of tapered wedge or eccentric cam for air-tightening mechanism shall be welded to the upper frame and sill.

The receptacle shall be made of stainless steel. The door frame and sill be equipped with gaskets.

C. Hardware

a. Latch and Locks

The tightening mechanism shall be designed to insert the eccentric cam on the body into the receptacle on the frame.

The mechanism shall be manually operated by a handle.

The handles shall not be operable from either inside the door when locked and the tightening and releasing mechanisms shall be functional only when unlocked.

Tightening devices shall be sufficient to withstand seismic, typhoon and missile force when the door is closed.

b. Hinges

The number and strength of hinges shall be decided taking into account seismic forces.

The hinges shall be a type which has bearings it shall be possible to run cables through one of E.P.T.

Their surface shall be stainless steel meeting ASTM A 666, type 316.

They shall be designed to open the door smoothly by about 10 kg (22 lb).
Airlock Door

c. Pull handles

The pull handles shall be made of stainless steel meeting ASTM A 666, type 316, and shall be installed with the center line of the handle 1,000 mm above the interior furnished floor. The handles shall be installed on both the inside and the outside.

d. Doors Stops

The doors stops shall consist of stainless steel plate, pipe and neoprene rubber and shall be fastened to the wall with expansion bolts.

The door stops shall be designed to be strong enough to withstand any impulsive force during door opening.

The angle of rotation shall be greater than 90 degrees to assure sufficient opening.

Door stops shall be designed and fabricated after deciding the opening angle. When a door opening of 180 degrees is difficult to achieve, due to many piping interference around the door frame, the shape of the door stops shall be designed and fabricated for a minimum of 90 degree opening.

The opening angle shall be notified by the Purchaser.

D. Embedded Plates (Stud, Bolts, and etc)

Embedded plates is not prescribed specially.

The type of installing door frame in advance is to be applicable.

A.1.6.2.3 Personnel Door (Type III Door)

A. Door

The door shall be have a minimum 80 mm thick, full flush formed from stainless steel plates meeting ASTM A 666, type 316L, of minimum 4.5 mm thick.

The door edges shall be closed with recessed channel end closer, and shall have no defects in air-tightness.

The internal stiffeners shall be designed to withstand seismic and typhoon forces and shall be welded to the face plates.
Airlock Door

B. Frame

The door frame and sill shall be welded structure fabricated from stainless steel plate meeting ASTM A 666, type 316L. The door frame shall be designed and fabricated to withstand seismic and typhoon forces. The door frames and sill shall be equipped with gaskets. The door frame and sill shall be welded to embedded steel plates by means of L-shaped angles and/or steel plates. The Supplier shall inform the Purchaser of all requirements regarding the embedded plates including studs. The Supplier shall furnish the embedded plates but not L-shape angles and steel plates. The Supplier shall furnish all information required to furnish and install these materials.

C. Hardware

a. Latch and Locks

The locking system shall be capable of withstanding seismic and typhoon forces when closed. The locking device shall not be released without a signal from the main control room. The tightening mechanism shall be designed to insert the eccentric cam on the body into the receptacle on the frame. The mechanism shall be designed to insert the eccentric cam on the body into the receptacle from inside of the door when locked and the tightening and releasing mechanisms shall be functional only when unlocked. Tightening devices shall be sufficient to withstand seismic, typhoon and missile force when the door is closed.

b. Hinges

The number and strength of hinges shall be decided taking into consideration the seismic and typhoon missile forces. The hinges shall be a type which has bearings and it shall be possible to run cables through one of E.P.T. Their surface shall be stainless steel meeting ASTM A 666, type 316L. They shall be designed so that the door can be opened smoothly with a force of less than or equal to 7 kg (15 lb).
Airlock Door

c. Pull handles

The pull handles shall be made of stainless steel meeting ASTM A 666, type 316, and shall be installed with the center line of the handle 1,000 mm above the interior furnished floor. The handles shall be installed on the inside of the door only.

The hinges shall be a type which has bearings and it shall be possible to run cables through one of E.P.T. Their surface shall be stainless steel meeting ASTM A 666, type 316L. They shall be designed so that the door can be opened smoothly with a force of less than or equal to 7 kg (15 lb).

d. Doors Stops

The doors stops shall consist of stainless steel plate, pipe and neoprene rubber and shall be fastened to the wall with expansion bolts. The door stops shall be designed to be strong enough to withstand any impulsive force during door opening. The angle of rotation shall be greater than 90 degrees to assure sufficient opening.

Door stops shall be designed and fabricated after deciding the opening angle. When a door opening of 180 degrees is difficult to achieve, due to many piping interference around the door frame, the shape of the door stops shall be designed and fabricated for a minimum of 90 degree opening. The opening angle shall be notified by the Purchaser.

D. Embedded Plates (Stud, Bolts, and etc)

Embedded plates is not prescribed specially. The type of installing door frame in advance is to be applicable.
A.1.7 Materials Requirements

The equipment furnished under this specification shall be constructed from the materials and to the Material requirements stated herein. All wetted materials shall be compatible with the process fluid for the intended service and environment conditions identified in this specification. Unless otherwise specified in the design drawings, materials shall conform to the following Standards.

1. General rolled structural steel shall conform to the requirement to JIS G3101 (SS400) or ASTM A36.

2. Steel sheets and shaped steel except using for Watertight Door shall conform to the requirement of JIS G 3193 or ASTM A6/A 6M.

3. Stainless steel sheet shall conform to the requirement of ASTM A666 or JIS G4304.

4. Carbon steel for machinery and structures shall conform to the requirement of ASTM A283/A283M.

5. Section modulus of rail shall be more than 290㎝³ and moment of inertia shall be more than 2,000㎝⁴.

6. Wheel shall conform to the requirements of ISS 212 or JIS G4051 or equivalent. When wheel conforms to ISS212, the shaft shall conform to the requirements of ISS 209 or equivalent.

7. Studs shall conform to the requirement of ASTM A108 or equivalent standard.

8. Insulation shall be mineral wool or fiber glass conformed to the requirement of UL.

9. Driving device including electrical parts shall conform to there requirements of UL but not be required UL labels.

10. Gaskets for Pressure resistant Door(type door) shall be of a vulcanized elastomeric compound containing neoprene as the sole elastomer and shall have the following Properties. The gasket adhesive shall be as recommended by the gasket manufacturer for the intended use.
Airlock Door

- Tensile strength in accordance with ASTM D412: 105kg/㎠ (1500psi) (min)
- Elongation at rupture in accordance with ASTM D412: 300 percent (min)
- Hardness in accordance with ASTM D2240. Shore A durometer: between 50 and 70.
- Ozone resistance in accordance with ASTM D1149: No cracks.
- Gaskets shall have sufficient cross-sectional area and resilience to maintain the required seal without exceeding the limits of compression set resistance of the material.

Gasket materials may be changed as long as fire rating and door sealing requirements as delineated in Section 3.3.4.11 and 12 are maintained.

11. Gaskets for Airlock Doors shall conform to the following requirement specified in JIS K6301 or ASTM D412, ASTM D1415, ASTM D1149 and ASTM D3395.
   - Tensile strength: 5kg/㎠ or more
   - Elongation: 150% or more
   - Hardness: 25±5 degrees (C scale hardness test)
   - Ozone-proof: 400°C, 50pphm, 72hr, 20% no crack

12. Sealant for glazing applied glass stops, spacers, wall anchors and other accessories shall be manufacture’s standard.

13. Driving device including electrical parts shall conform to the requirements of UL but not be required UL labels.

14. Alarm system including switches, junction boxes, conduit and wiring shall conform to the requirements of IEEE323.

15. The miscellaneous material (e.g. hinges, dead bolts, alarm switches and latching mechanisms) shall be the SAMHOON manufacturer’s standard unless otherwise shown or specified and shall be shop installed.

16. The Dedicated Commercial Grade Item (DCGI) is not allowed for use in this Bid.
A.1.8 Fabrication Requirements

A. Tolerance
If a tolerance is specified in the design drawing, the specified values shall be applied.
ANSI/AISC N690 1984 can be used for the allowable stress design of special doors.
TPC requires the Supplier to furnish embedded plates, studs and rails which will be installed by Purchaser under supervision and acceptance of the technician Assigned by Supplier.

The tolerances of dimensions not described in the design drawing the sectional arrangement of each door shall be based on the following Standards.

1. The doors shall conform to the values in Table 3.2 as regards Effective span of the opening gap between door frame and the body, and also for the diagonal dimensions.

2. The values in Table 3.3 shall be applied to other dimensions that do not directly affect the essential properties of the doors.

Table 3.2 Effective Span of the Opening and the Gap.

<table>
<thead>
<tr>
<th>Item</th>
<th>Tolerance (mm)</th>
<th>Diagonal length</th>
<th>Tolerance (mm)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective span Of opening Gap for Laminated Doors and Concrete Filled Doors</td>
<td>+/-3.0</td>
<td>Less than 6M</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>+/-5.0</td>
<td>Less than 6M</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>+/-3.0</td>
<td>Less than 10M</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>+/-5.0</td>
<td>Less than 10M</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>
Table 3.3 Tolerance of Other Dimensions

<table>
<thead>
<tr>
<th>Dimensions (mm)</th>
<th>Tolerance (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 500</td>
<td>+/-2.0</td>
</tr>
<tr>
<td>500 - 1000</td>
<td>+/-3.0</td>
</tr>
<tr>
<td>1000 - 2000</td>
<td>+/-4.5</td>
</tr>
<tr>
<td>2000 - 2500</td>
<td>+/-5.5</td>
</tr>
<tr>
<td>2500 - 3150</td>
<td>+/-7.0</td>
</tr>
<tr>
<td>More than 3150</td>
<td>+/-9.0</td>
</tr>
</tbody>
</table>

B. Welding

Welding shall meet the requirements of AWS D1.1.
The final welds shall be visually inspected to the requirements of AWS D1.1.

Welding in connection with this work refers to arc welding, carbon dioxide semiautomatic welding or TIG welding.
Workers shall be qualified welders who have passed the following qualification examination for welding as regards work performance ability to weld a variety of plate thickness.

1. Arc welding: Qualified welders who have passed the AWS D1.1 or JIS Z 3801 requirements.

2. Carbon dioxide semiautomatic welding: Qualified welders who have passed the AWS D1.1 or JIS Z 3841 requirements.

3. TIG welding: Qualified welders who have passed the AWS D1.1 or JIS Z 3821 requirement.

Welds whose failure could cause a drop of the load shall be post-weld heat treated in accordance with AWS D1.1 when such welds are susceptible to lamellar tearing.
4. The exemption condition of post-heat
   In case of installment of Missile Resistant Door, the exemption condition of post-heat follows the following exemption conditions, but the matters of pre-heat should be conducted with the list below.

1. The heating treatment requisites of AWS D1.1

   a. The matters about pre-heating
      According to clause 3.5 of AWS D1.1 (Minimum Preheat and Interpass Temperature Requirements, pre-heat temperature should keep 107°C (Table 3–2)).

   b. The matters about post-heating
      Whereas not specially mentioned in the prime requirements of the clients, decide as an exempted one according to ASME Section IX.

      General welding process documents, the verification of welder, the process documents of inspector’s confirmation follows the process documents of Sam hoon Machinery.

C. Surface Preparation and Painting

Surface Preparation and Painting System as following:

_Painting, Coating, and Surface Preparation_ (Appendix A100)

A100.1 Scope

This specification provides general painting, coating, and surface preparation requirements for Supplier furnished equipment and materials for the Lungmen Nuclear Units 1 and 2 Nuclear Island scope–of–supply.
A100.2 Codes and Standards

The equipment furnished under this specification shall be designed to the following major industrial codes and standards.

<table>
<thead>
<tr>
<th>Code</th>
<th>Code Title</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>American National Standard(ANSI)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N45.2.2</td>
<td>Packaging, Shipping, Receiving, Storage and Handling of Items for Nuclear Power Plants</td>
<td>1972</td>
</tr>
<tr>
<td><strong>American Society of Testing and Materials(ASTM)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D1535</td>
<td>Standard Practice for Specifying color by the Munsell system</td>
<td>1996</td>
</tr>
<tr>
<td>D5139</td>
<td>Standard Specification for Sample Preparation for Qualification Testing of Coating to be Used in Nuclear Power Plants</td>
<td>1990</td>
</tr>
<tr>
<td><strong>Steel Structures Painting Council(SSPC)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA-1</td>
<td>Shop, Field, and Maintenance Painting</td>
<td>1972</td>
</tr>
</tbody>
</table>
A100.3 Description

All metallic surfaces subject to corrosion shall be protected by suitable coatings applied in the shop. Surfaces which will be inaccessible after assembly shall be protected for the life of the equipment. The surfaces shall be cleaned and prepared in the shop.

Exposed surfaces shall be finished smooth, thoroughly cleaned, and filled as necessary to provide a smooth uniform base for painting. Surfaces to be finish painted after installation, or requiring paint for corrosion protection until installation, shall be shop painted with one or more coats of paint as hereinafter specified.

A100.3.1 Painting Material

1. Painting material for interior steel doors.
   Painting material (first coat) applied to steel surface of interior door shall conform to the requirements of ASTM D5144 or ANSI N5.12 except DBA testing. The painting material shall be the same material which the Erection/installation Contractor selects as painting system NA5 which is described in the RB & CB Civil Construction Specification. The painting system is as indicated on the painting System Data Sheet at the end of this appendix.
A100.3.2 Surface Preparation

Dirt, dust, sand, mud, oil, grit, rust, loose mill scale, and other objectionable substances shall be removed from surfaces to be painted before applying paints. Surface preparation shall be performed in a manner which will prevent dust and other airborne particles from contaminating freshly painted surfaces. Oil or grease shall be removed from surfaces with solvents before starting mechanical cleaning.

Manufacturer’s instructions for surface preparation and application requirements peculiar to each material applied shall be followed.

Clean cloths and clean fluids shall be used for solvent cleaning to avoid leaving a film on the surface being cleaned. Surfaces not to be painted shall be protected from contamination, discoloration, or other damage resulting from surface preparation operations.

All exposed steel surfaces shall be Near-White Blast Cleaning in accordance with SSPC-SP10. After cleaning, first coat shall be applied to steel surfaces immediately to prevent new rusting.

A100.3.3 Painting

Before use, painting shall be inspected to confirm that they meet this specification requirements of type, quantity, color, packaging, and identification of each material.

Mixing and application equipment shall meet the coating manufacturer’s recommendations.

Mixing and thinning of painting shall be routinely inspected. Only the type and quality of converter and thinner recommended by the painting manufacturer shall be used.

Undercoating shall be carried out immediately after the ground has been prepared and the surface to be coated has been cleaned.
Paint shall be applied by a brush, roller or spray in accordance with the manufacturer’s instructions. All materials, when brushed, shall be evenly flowed on with brushes best suited for the type of material being applied.

All unprotected carbon steel surfaces shall be cleaned and painted with the Supplier’s (Purchaser approved) standard primer and finish paint. Stainless steel surfaces, parts buried in concrete and parts in concrete with each other after fabrication shall not be painted.

Parts that cannot be finish coated at the site shall be finish coated at the factory.

A100.3.4 Paint Film Thickness

The thickness of painting and coatings shall conform to the required minimum dry film thickness specified in conjunction with each paint system. The more stringent thickness requirements shall be used when the Erection/installation Contractor’s instructions differ from the foregoing requirements. The specified film thickness shall be a minimum of the profile depth of the surface to be coated plus the specified dry film thickness. The dry film thickness shall be inspected in accordance with SSPC Vol.I "Inspection" and SSPC-PA-2.

A100.3.5 Curing

The paint manufacturer’s recommendations shall be followed for minimum drying time between coats and drying time before placing.

A100.3.6 Cleanliness

Throughout the work, proper dropcloths, masking, tapes, and other protective measures shall be provided and used as necessary to protect surfaces from accidental spraying, splattering, or spilling of paint. Damage resulting from painting operations shall be corrected and repaired. Paint deposited on surfaces not being painted shall be immediately removed.

Hardware, hardware accessories, machined surfaces and similar items in contact with painted surfaces and not to be painted shall be removed, masked, or otherwise protected prior to surface preparation and painting operations.
A100.3.7 Control and Electrical Equipment

Control and electrical equipment, including panels, cabinets, switchgear, motor control centers, transformers, motors, and other similar equipment shall be cleaned, prepared, and coated. Control instruments and devices and computer equipment shall be furnished with manufacturer's standard paint. The Supplier shall furnish sufficient touchup paint for repairing 25 percent of the area on all factory painted external surfaces of each item of electrical equipment. The touchup paint shall be of the same type and color as the factory applied paint and shall be carefully packed to avoid damage during shipment. Complete painting instructions shall be furnished.

A100.3.8 Preservative Coatings

Ferrous surfaces which should not be painted and are subject to corrosion shall be protected with preservative coatings. All surfaces of equipment shall be coated with rust-preventive compound. The manufacturer and manufacturer's designation of all coatings proposed to be used shall be submitted to the Purchaser for acceptance prior to application. Preservative coatings shall not be applied to stainless steel. Aesthetics are important. Painting of stainless steel to cover blemishes in the finish is not acceptable.

A100.4 Design Requirements

The following section lists site-specific climatological and information. Coatings for equipment shall be capable functioning in the radiation environment to which the equipment is qualified. Radiation environments are identified for equipment in the Purchase Specification.
A100.4.1 Tropicalization

Due to the humid subtropical climate zone of the Owner's project site, painting and coating of all equipment (herein to include equipment assemblies or subassemblies, components, and materials) shall be "tropicalized" to protect the equipment from the growth of fungus.

The following climatological parameters are applicable to the project site:

<table>
<thead>
<tr>
<th></th>
<th>Maximum</th>
<th>Minimum</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>37.9℃ (100℉)</td>
<td>3.4℃ (38℉)</td>
<td>21.7℃ (71℉)</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>100percent</td>
<td>32percent</td>
<td>83percent</td>
</tr>
</tbody>
</table>

Other climate conditions unique to this project include severe salt laden air and rain fall, frequent typhoons, and winds.

Application of tropicalization preventives and varnishes shall be done according to the requirements of MIL-T-152B and MIL-V173C. Application of the varnishes shall not interfere with the operation or performance of the equipment.

Equipment treatment is intended to accomplish the following:

1. Impart non-wet-ability to surfaces.
2. Retard the absorption of moisture.
3. Inhibit the growth of fungi.

Non-nutrient materials (non-fungus supporting) need not be treated. Each treated unit of equipment, and equipment that is inherently tropicalized due to its materials of construction and the containers in which it has been packaged for shipment, shall be permanently marked with the words TROPICALIZED.
Painting System Data Sheet System NA5

Description: Surface of steel hatches, metal forms of concrete hatches and their openings, surfaces of special doors except bullet resistant doors, and all steel surfaces in "D" area except structural steel. Environmental Zones 1A(interior, normally dry), USNRC Regulatory Guide 1.54 shall not be applied. Surface Preparation: SSPC-SP10

Material of Painting system NA5 shall conform to the requirements of ASTM D 5144 except DBA Testing.

<table>
<thead>
<tr>
<th>Coating</th>
<th>Dry Film Thickness</th>
<th>Special Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Coat</td>
<td>65 micron</td>
<td>Inorganic Zinc</td>
</tr>
<tr>
<td>Second Coat</td>
<td>100 micron</td>
<td>Epoxy</td>
</tr>
<tr>
<td>Third Coat</td>
<td>100 micron</td>
<td>Epoxy</td>
</tr>
</tbody>
</table>

Note: Dry Film Thickness is information value. Total Dry Film Thickness shall be not less than 250 micron. The amount of lead contained in inorganic zinc for the first coat should be less than 0.01%.

Regarding the surface finishing and painting, these will be remained for the quality assurance record and also the 3 liter (1 gal) of the extra paint, to finish the touchup work at the field, with a document will be provided to the purchaser.

D. Identification of Materials, Parts and Components

The parts of the each missile resistant door will be provided the below information label with an aluminum name tag attached on one side of the each door.

1. The name of the manufacturer
2. The Serial numbers
3. The specifications numbers
4. The tag numbers (as stated on the drawing or on the schedule)
5. The other details were stated on the specifications (weight, a number of the door et cetera.)
E. Test and Inspection Requirements

The Purchaser shall be notified 45 days in advance prior to the start of fabrication for conducting general inspections and progress reports. Release for shipment is a mandatory hold point for which prior notification is also required.

F. Shop Assembly and Operational Test

Missile resistant doors shall be shop assembled as a unit in the shop to ensure that the parts are properly fitted.

Suppliers should provide test procedures for investor review and approval.

Control panels, operation boards and wiring shall be shop assembled.

All doors shall be opened and closed smoothly and quietly after assembling.

Components shall be match-marked to enable proper alignment and fit of all parts during field assembly.

The Purchaser or Purchaser’s representative shall be given full shop access (including the Supplier’s subcontractors shops) during normal working hours while equipment is being fabricated or manufactured. The Purchaser will make inspections as scheduled in the Inspection and Test Plan.

The Purchaser reserves the right to inspect the work at other times.

Final inspections will be made by the Purchaser or Purchaser’s representative before the equipment is packaged and ready for shipment.

The Supplier shall be responsible for conducting all examinations, inspections, and tests (including recording of results and maintaining records thereof), and shall furnish all required testing materials and equipment (including certifications) as required.

The Purchaser or Purchaser’s authorized representative shall have access to all fabrication and testing documents required by this specification, including any documents from Supplier’s Suppliers or subcontractors.
The Suppliers shall be responsible for their own product and perform the inspection and prepare inspection record to submit for Purchaser approval. The manufacturer shall prepare installation manual and to get Purchaser approval before commence of installation work.

G. Inspection Criteria

Inspections of the Special doors and windows shall be carried out in accordance with ASME NQA-1 and Section 3.4 in this specification.

H. Testing Criteria

The air leak test for personnel airlock doors shall be carried out under the following conditions.

- Width: 1,000 mm
- Height: 2,100 mm
- Pressure: 300 kg/m² from negative pressure side shown in Appendix A70.

The air leak test for doors in Large Component Entrance Airlock shall be carried out under the following conditions.

- Width: 5,000 mm
- Height: 5,300 mm
- Pressure: 300 kg/m² from negative pressure side shown in Appendix A70.

Operational testing shall be performed in accordance with this specification and applicable codes and standards.
All tests performed shall ensure proper performance of driving devices and safety devices.

Testing of the special doors and windows shall be carried out in accordance with ASME NQA-1 and Section 3.4 in this specification.
The Field Acceptance Tests shall be conducted for each special door/window as mentioned above at the scheduled date by the Purchaser under the witness of Supplier’s representative.
In case the supplier wishes not or fails to send its representative to Job Site to witness the Field Acceptance Tests, the results of tests made by Investor shall be accepted by the Supplier.
However, if the Supplier considers the execution made by Investor is not correct, the Supplier may at its option and subject to Investor’s approval bring its own operators to operate the work during the field acceptance tests.
The dispatch of above the Supplier’s representative and Operator shall be borne by the supplier and at no cost to Investor. Also, the field acceptance test shall not void any of the Supplier’s equipment warranties.

The Bidder shall provide detailed description and procedure of the field acceptance test in his Proposal, which shall at least include test instrument list and test periods expected. The Supplier shall insure that sufficient connections and hardware support facilities are available for the instrumentation that will be used to collect the data for the test. The Supplier will be notified when the field acceptance test shall take place.

The Supplier shall provide detailed test description and procedures prior to conducting of the field acceptance test for the Purchaser/Engineer review and approval. The field acceptance tests are tests on function of electrical and mechanical components. All costs associated with the vendor’s participation in preparing/supporting/performing and witness/reviewing of the field acceptance test will be on the vendor’s account.

I. Witness and Hold Points

The Supplier shall submit, for Purchaser review and approval, a recommended Inspection and Test Plan, including Purchaser identified and Supplier recommended witness and hold points, within 60 days after contract award.

The Purchaser reserves the right to add additional witness and hold points after receiving the Inspection and Test Plan.

All witness and hold points shall be summarized in the notification list included as part of the procurement package.
J. Field Acceptance Test

The Field Acceptance Test will be conducted for each special door/window as mentioned above at the scheduled date by Purchaser under the witness of Supplier’s representative. In case the supplier wishes not or fails to send its representative to Job Site to witness the Field Acceptance Tests, the result of tests made by Investor, shall be accepted by the Supplier. However, if the Supplier considers the execution made by Investor is not correct, the Supplier may at its option and subject to Investor’s approval bring its own operators to operate the work during the field acceptance tests.

The dispatch of above the Supplier’s representative and operator shall be borne by the supplier and at no cost to Investor. Also, the field acceptance test shall not void any of the Supplier’s equipment warranties.

The Bidder shall provide detailed description and procedure of the field acceptance test in his Proposal, which shall at least include test instrument list and test periods expected. The Supplier shall insure that sufficient connections and hardware support facilities are available for the instrumentation that will be used to collect the data for the test. The Supplier will be notified when field acceptance test shall take place.

The Supplier shall provide detailed test description and procedure prior to conducting of the field acceptance test for the Purchaser/Engineer review and approval. The field acceptance test shall include the items of installation inspection (dimension and fixing stability) and final inspection (appearance, movement and air leak).

The air leak test is performed for airtight and semi-airtight doors only. This air–leak checks airflow through the doors one by one by using smoke. The installer needs to be present to repair any leak found through the doors one by one using smoke.

The installer needs to be present to repair any leak found in the smoke test or in sight by the guidance of the vendor or Investor.

All costs associated with the vendor’s participation in preparing/supporting/performing and witness/reviewing of the field acceptance test will be on the vendor’s account.

K. Handling, Shipping, and Storage Requirements

It is expected that the equipment covered by this specification will be temporarily stored outside at the jobsite with no protection before installation.

Packing requirements either use ASME NQA–1, ANSI N45.2.2 (for Class S) or ANSI/ASQC Q9001 (for Class R).

For S & R items, the packing shall meet the requirements of RG 1.38, Rev. 2 and NQA–2 Part 2.2.
L. Cleaning and Shipping Requirements

The interior of all equipment shall be free of all foreign material, such as Welding rod, waste, mill scale, oil, grease, or other deleterious material. All openings shall be closed immediately after cleaning. Rust, if any, shall consist of not more than a surface film discoloration that can be readily removed by wiping. It shall be the Supplier’s responsibility to keep Purchaser’s inspector so informed that he can personally satisfy himself that the requirements of this paragraph are being complied with.

After completion of factory assembly and testing, each special door or windows shall be disassembled into the minimum number or parts practicable. All equipment and materials shall be suitably crated, boxed, or otherwise prepared for shipment to prevent damage during handling and shipping.

All openings and accessories, if dismantled for shipment, shall be capped or otherwise properly sealed to protect them from contamination or corrosion and to prevent the entrance of dirt or debris. All parts which, of necessity due to physical size or arrangement, may be exposed to the weather shall be adequately protected by suitable weatherproofing. It shall be the responsibility of the Supplier to take any other precautions required to reasonably ensure job site arrival of the equipment in an undamaged and satisfactory working condition.

All containers shall be plainly marked with purchase order number, item number, designation of the parts enclosed, shipping weight, and such additional identifying data as may be specified by Purchaser. All individual parts and components shall be designed in such a manner as to facilitate installation in the field.

M. Provision for Storage

Any special storage requirements that should be followed in order to maintain the equipment in the as-shipped condition shall be forwarded to the job site with each shipment to which they are applicable.

. Preventive maintenance

The preventive of the requested maintenance controls will be submitted with a sealed proposal.
O. Technical Manuals

No later than twelve (12) weeks after NTP, three (3) preliminary sets of bound unloading, storage, installation, operation, test manual (construction and pre-operation phases), and maintenance instructions shall be sent to the Purchaser.

No later than twenty four (24) weeks after NTP, the supplier shall submit to the Purchaser, seventeen (17) complete bound copies of the unloading, storage, installation, operation, and maintenance instructions for each item of equipment furnished. Replacing pages for the above said three (30) preliminary sets shall also be furnished if there is any revision made. All final instructions shall be certified by the Supplier as applicable to the equipment furnished and shall be specifically identified as such by serial number.

One set of instructions certified by the Supplier shall be packed and sent with the equipment to the site.

Each instruction manual shall contain a copy of the Supplier’s As-Built data sheets, as tested performance curve, bill of materials, outline drawings and all detail fabrication drawings. Additionally, to facilitate routine maintenance work, the manual shall include a full details of all components including spare parts required for maintenance purposes.

Operating, installation and maintenance instructions are required by this specification. They shall be completely self-contained and include the following as a minimum:

1. Identification of the Purchaser’s purchase order number.

2. Unique equipment identification (e.g., serial or model number)

3. All necessary requirements and procedures to operate, install, and maintain equipment in the as-shipped condition.

4. Preventive maintenance requirements for the life of the equipment.

5. A list of warnings and essential actions to avoid serious damage during installation, testing and operation.

6. A recommended service schedule (for the life of the equipment) and shelf life of materials and parts, if appropriate.
7. A list of any special tools and instructions for alignment, leveling, etc., when required.

A parts identification list shall be included in the OIM or provided separately. It shall provide details of all equipment, including sectional and/or outline drawings or illustrations identifying each numbered part and location in relation to the equipment as a whole.

Any drawings provided as part of the operation, installation and maintenance instructions shall be consistent with those approved by the Purchaser.

All final instructions shall be certified by the manufacturer as applicable to the equipment furnished. Certification means that the instructions are authentic (i.e., signed and dated by a responsible individual) and they fully comply with this specification and any supplier documents approved by the Purchasers.

P. Technical Advisory Services

1. If requested by Investor, the Supplier and its Subcontractor(s) shall provide personnel to perform the following technical advisory services at Jobsite:

A. Provide supervision of the construction/installation activities performed by Investor and its contractors.

B. Provide supervision for the field and Performance Tests.

C. Issue documentation during the startup period, showing that each equipment erected or installed by Investor and its contractors has been tested to the Supplier’s satisfaction in respect to safe operation and in accordance with design features, characteristics and conditions.

D. Perform coordination services, interpret the Supplier’s design drawings and documents, prepare various documents, assist Investor to performing schedule control for construction/ installation, field tests/Performance Testing, and assist Invertor in solving construction/ installation, activities, field/ Performance Test problems, and give general advice for construction/ installation, field/ Performance Testing.

E. Review/assist Investor’s construction/ installation and field tests/Performance Tests
2. The Supplier shall provide technical service during the period from the beginning of equipment erection until the completion of the work. Number and qualification of the service engineer(s) shall be approved by Investor, and the beginning and duration of service shall meet Investor’s erection need.

3. The Supplier shall submit biographical data for Investor’s review in the form required by Investor, for each personnel to be assigned to the Job Site under the Contract. For the provision of contractual services on Job Site, the Supplier shall engage only personnel with adequate experience who in the past have successfully completed assignments of similar nature and scope.

   If any of the Supplier’s personnel is deemed by Investor to be incompetent for the work assigned, the Supplier shall, upon receipt of notification from Investor, at the Supplier’s cost and expense, dispatch a competent replacement satisfactory to Investor within fourteen (14) calendar days.

   The Supplier’s or its Subcontractor’s personnel are required to undergo a medical examination to assure they are in good physical condition before their assignment to the Site for services.

   The Supplier’s assignment, withdrawal and/or replacement of any service personnel shall be obtained Investor’s written permission in advance.

   Request for such permission shall state the duration of such assignment, withdrawal and/or replacement, along with a resume of the replacing personnel. At any time if, in the opinion of Investor, such withdrawal or replacement may adversely affect the successful completion of the work or any of its obligations under the Contract, such request for withdrawal or replacement will be rejected.

4. Investor will notify the Supplier in writing at its official address thirty (30) days in advance of the date on which Investor desires any such personnel to report for work.

5. The Supplier shall at his expense equip his personnel with such Special Tools and appliances as may be required by them to perform their work.

6. Other conditions of services are:

   A. The Supplier’s supervisory and startup personnel shall speak fluent English.

   B. During erection and commissioning, the Supplier shall supply to Investor free of charge and for Investor free use the following routing information:
Airlock Door

i. Each working day the site diary in the English language in two (2) copies. The diary shall include all basic instruction, type of work performed, interruption of work indicating reasons, and any other event of importance. Investor’s representative and the Supplier’s service engineer shall sign all entries made in the diary. In case of divergence of opinion, the views of both representatives shall be recorded.

ii. On or before the fifth (5th) of every calendar month, a progress report must be made giving a summary of progress made in the preceding month.

Upon arrival of the Equipment or completion of work at the Job Site, representatives of Investor and of the Supplier, if Investor so requests, will jointly check the completeness of the work and whether the Equipment has been damaged during transportation.

Q. Consumable Supplies

A. The Supplier shall supply, free of charge to Investor, all consumable supplies required to perform installation, testing, startup, commissioning, initial operation and standard warranty period as specified in section 2.10 of all equipment supplied by Supplier. A consumable supplies list shall be provided by the Bidder in the Proposal for Investor’s review. If any additional consumable supplies that are not listed in the Bidder’s proposed list are Required during the installation, testing, startup, commissioning, initial operation and standard warranty period, or the quantities listed in the Bidder’s proposed list are not enough for use. The supplier shall supply these required consumable supplies at no additional cost to Investor. These consumable supplies shall be delivered with the equipment in accordance with the Contract delivery schedule.

B. In addition, upon Investor’s request, the Supplier shall quote a Recommended Spare Parts list specifying the price, quantity, and delivery lead time for each of the Recommended Spare Parts for three (3) years operation and maintenance (for use after the standard warranty period) for Investor’s consideration to purchase under a separate contract. Each spare part shall be fully identified by part number and drawing number.

C. The list of the consumption parts will be attached on the back in separate.
R. Special Tools

The Supplier shall provide the following tools and services:

The Supplier shall provide, free of charge to Investor on loan basis, all special tools, including the required test equipment and instruments, required to perform installation and testing of all equipment supplied by the Supplier.

A special Tools list shall be provided by the Bidder in the proposal for Investor’s review. If any additional special tools, that are not listed in the Bidder’s proposal list, are required during the installation, test period or the quantities listed in the Bidder’s proposal list are not enough for use during the installation, test period, the Supplier shall provide these required special tools on loan basis at no charge to Investor.

The special tools, including test equipment and instruments, shall be delivered with the equipment or before the start of work in accordance with the delivery schedule and will be re-exported and returned to the Supplier after the work is finished.

The special tools shall be delivered with their corresponding system or equipment.

A. Upon Investor’s request, the Bidder shall quote a Recommended Special Tools list specifying the price, quantity, and delivery lead time for each of the Recommended Special Tools for initial operation and maintenance for TPC’s consideration to purchase under a separate contract.

Each Special Tool shall be fully identified by part number and drawing number. The list will include two complete sets, one for each unit of special tools. All special tools shall be new.

Special Tools to be used in radioactive areas shall be designed for effectiveness and automatic operation, if possible, to meet the intent of ALARA.

C. The list of the special tools will be attached on the back in separate.
S. Delivery Schedule

The Supplier shall deliver the equipment by FOB port of export.
The delivery schedule is no less than the following schedule.
For early delivery exceed one month ahead of the delivery schedule in the below table, the Paragraph 1.17 of this specification will be applied.

(Months after NTP)

<table>
<thead>
<tr>
<th>Description of Building for delivery</th>
<th>Delivery Date for Unit 1</th>
<th>Delivery Date for Unit 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FOB Port of Export</td>
<td>FOB Port of Export</td>
</tr>
<tr>
<td>Electric Single Sliding Doors</td>
<td>19</td>
<td>27</td>
</tr>
<tr>
<td>for Personnel Airlock</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large Component Entrance Airlock</td>
<td>19</td>
<td>27</td>
</tr>
</tbody>
</table>

A.1.9 Attachment

1. Technical Data by Bidder/Seller ---------------7 SHEET
2. Bidder’s Proposed Schedule -------------------3 SHEET
3. Subcontract Information Lists ---------------7 SHEET
4. Consumable Supplies Lists -------------------2 SHEET
5. Recommended Spare Parts ---------------------1 SHEET
6. Special Tools ------------------------------2 SHEET
7. Supplier Information Request -----------------2 SHEET
Airlock Door

Airtight Conditions of Airlock Door for Personnel
Electric Single Sliding Door for Personal Airlock

ATTACHMENT 1: Technical Data by Bidder/Seller

<table>
<thead>
<tr>
<th>TECHNICAL DATA BY BIDDER/SELLER</th>
<th>삼훈기계 (SAM HOON MACHINERY CO.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIR LOCK DOORS</td>
<td></td>
</tr>
<tr>
<td>Electric Single Sliding Door</td>
<td></td>
</tr>
<tr>
<td>Door Number</td>
<td></td>
</tr>
<tr>
<td>Door Size</td>
<td></td>
</tr>
<tr>
<td>Width, mm</td>
<td></td>
</tr>
<tr>
<td>Height, mm</td>
<td></td>
</tr>
<tr>
<td>Thickness, mm</td>
<td></td>
</tr>
<tr>
<td>Motor information</td>
<td></td>
</tr>
<tr>
<td>Motor type</td>
<td></td>
</tr>
<tr>
<td>Kw</td>
<td></td>
</tr>
<tr>
<td>rpm</td>
<td></td>
</tr>
<tr>
<td>Field assembly</td>
<td></td>
</tr>
<tr>
<td>Number of sections to be joined in the field</td>
<td></td>
</tr>
<tr>
<td>Amount of field welding required</td>
<td></td>
</tr>
<tr>
<td>Amount of field bolting required</td>
<td></td>
</tr>
<tr>
<td>Estimated number of man-hours required for erection</td>
<td></td>
</tr>
<tr>
<td>Bidder's Name</td>
<td>삼훈기계 (SAM HOON MACHINERY CO.)</td>
</tr>
</tbody>
</table>
### ATTACHMENT 2 : Bidder’s Proposed Schedule

A. Bidder’s proposed preliminary drawings and documents submittal list and schedule (to be referred to Paragraph 3.4.2 of the Specification) from the date of Notice to Proceed.

B. All Bidder’s technical Documents shall be either in English or Chinese with English translation during the Bidding stage. The Commercial document can be either in English.

<table>
<thead>
<tr>
<th>Drawing / Documents</th>
<th>Description</th>
<th>(Proposed submittal Schedule)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>Unit 1</strong> (in month)</td>
</tr>
<tr>
<td>Assembly and outline drawings (Preliminary/Certified)</td>
<td>With Bid/8 wks after NTP</td>
<td></td>
</tr>
<tr>
<td>Elementary diagrams (Preliminary/Certified)</td>
<td>With Bid/8 wks after NTP</td>
<td></td>
</tr>
<tr>
<td>Spare parts listing</td>
<td>With Bid</td>
<td></td>
</tr>
<tr>
<td>Special tools listing</td>
<td>With Bid</td>
<td></td>
</tr>
<tr>
<td>Strength calculations (seismic, pressure resisting, missile resisting)</td>
<td>With Bid/12 wks after NTP</td>
<td></td>
</tr>
<tr>
<td>Special transportation considerations</td>
<td>With Bid/One month before Shipment</td>
<td></td>
</tr>
<tr>
<td>Door hardware drawings (including Electrical Locks per Para.3.3.3.6.1.1)</td>
<td>With Bid /8 wks after NTP</td>
<td></td>
</tr>
<tr>
<td>Embedded plates and studs</td>
<td>8 wks after NTP</td>
<td></td>
</tr>
<tr>
<td>Control wiring, connections, and Terminal block arrangement (including Alarm System per Para.3.3.3.7)</td>
<td>With Bid /12 wks after NTP</td>
<td></td>
</tr>
<tr>
<td>Certificate of compliance</td>
<td>With shipment</td>
<td></td>
</tr>
</tbody>
</table>
## Airlock Door

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Timeframe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welding procedure and welder qualifications</td>
<td>12 wks after NTP</td>
</tr>
<tr>
<td>Welding qualification test records</td>
<td>12 wks after NTP</td>
</tr>
<tr>
<td>Material certificates</td>
<td>Before fabrication</td>
</tr>
<tr>
<td>Inspection and Test plan</td>
<td>60 days after NTP</td>
</tr>
<tr>
<td>QA Program</td>
<td>With Bid</td>
</tr>
<tr>
<td>Bill of materials</td>
<td>12 wks after NTP</td>
</tr>
<tr>
<td>Coating system inspection report</td>
<td>Upon completion of inspections</td>
</tr>
<tr>
<td>NDE Test Report</td>
<td>Upon completion of examinations</td>
</tr>
<tr>
<td>Significant defects/deficiencies report</td>
<td>Once identified</td>
</tr>
<tr>
<td>Repair records</td>
<td>Upon completion of repairs</td>
</tr>
<tr>
<td>Inspection Report</td>
<td>Upon completion of inspections</td>
</tr>
<tr>
<td>List of components to be shipped separately</td>
<td>One month before shipment</td>
</tr>
<tr>
<td>Supplier deviation/change request</td>
<td>Once identified through SIR</td>
</tr>
<tr>
<td>Training Proposal</td>
<td>With Bid/12 weeks after NTP</td>
</tr>
<tr>
<td>Technical Manuals</td>
<td>12 weeks after NTP (3 preliminary sets)/24 weeks after NTP (17+3 complete bound copies)</td>
</tr>
<tr>
<td>Field Performance/Acceptance Test Procedures and Requirements</td>
<td>With Bid/12 weeks after NTP</td>
</tr>
<tr>
<td>Shipping procedure for special shipment</td>
<td>One month before shipment</td>
</tr>
<tr>
<td>Specific QA program</td>
<td>After NOA</td>
</tr>
<tr>
<td>QA record list</td>
<td>After NOA</td>
</tr>
</tbody>
</table>
ATTACHMENT 3: Subcontract Information Lists

The Bidder shall provide the relevant Subcontract Information list in its Proposal for review/approval. The Supplier shall not subcontract all of the fabrication work if it has been successfully pre-qualified by its performance experience in design and manufacturing. If the Bidder considers it is necessary to subcontract portion of the fabrication work to the qualified subcontractors under special circumstances (e.g., tight delivery schedule, long term partners, etc.), the Bidder shall list those items including Door/Window numbers as shown in BOQ to be subcontracted in its Technical Bid Proposal for Investor’s review and approval.

A. Subcontracted Items for Equipment
   Equipment Description

ATTACHMENT: VENDER APPROVAL LIST

The Bidder may attach other sheet(s) if additional space is required.
ATTACHMENT 4: Consumable Supplies Lists

A. Consumable Supplies
The Supplier shall provide all necessary consumable supplies based on actual requirements. If Consumable Supplies Lists have any discrepancy with that required in the Paragraph 3.3.13 of the Specification, the one mentioned in the Specification shall prevail.

1. Consumable supplies for Installation, Testing, Startup, Commissioning, Initial operation and standard warranty period as specified in Specification Paragraph 3.3.13.A

<table>
<thead>
<tr>
<th>NO</th>
<th>Description</th>
<th>Quantity</th>
<th>RBSW Pump House &amp; AFB,CPSS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>UNIT1</td>
<td>UNIT2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

The Bidder may attach other sheet(s) if additional space is required.
ATTACHMENT 5 : Recommended Spare Parts

A) Recommended Spare Parts for three years operation and maintenance
(for use after standard warranty period) for Investor's consideration to purchase under a separate contract as specified in Specification Paragraph 3.3.13.

<table>
<thead>
<tr>
<th>NO</th>
<th>Description</th>
<th>Quantity</th>
<th>RBSW Pump House &amp; AFB, CPSS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>UNIT1</td>
<td>UNIT2</td>
</tr>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

The Bidder may attach other sheet(s) if additional space is required.
ATTACHMENT 6: Special Tools

(1) Special Tools for installation, Testing, shall be supplied, free charge to TPC on loan basis, as specified in the Specification Paragraph 3.3.14.A

(2) Recommended Special Tools for initial operation and maintenance for Investor’s consideration to purchase under a separate contract as specified in Specification Paragraph 3.3.14B. Please list item(1) and (2) separately.

<table>
<thead>
<tr>
<th>NO</th>
<th>Description</th>
<th>Quantity</th>
<th>RBSW Pump House &amp; AFB, CPSS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>UNIT1</td>
<td>UNIT2</td>
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</tbody>
</table>

The Bidder may attach other sheet(s) if additional space is required
**ATTACHMENT 7: SUPPLIER INFORMATION REQUEST(SIR)**

<table>
<thead>
<tr>
<th>SUPPLIER INFORMATION REQUEST</th>
<th>JOB ORDER</th>
<th>P.O./CONTRACT NO(s)</th>
<th>RECORD TYPE CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TO: Purchaser</td>
<td>FROM: SAMHOON MACHINERY COMPANY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supplier Name and Address</td>
<td>SAMHOON MACHINERY COMPANY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#532-5 SIMGOKBON1-DONG, SOSA-GU, BUCHOEN-CITY, KYUNGGI-DO, S. KOREA</td>
<td></td>
<td></td>
<td>PAGE a of Date of Request</td>
</tr>
</tbody>
</table>

**Problem Description**

**Proposed Solution (Include technical justification if necessary)**

**Signature and Title of supplier Rep.making Request**

**Dept. Tel. No.**

**Need reply by**

**Reply:**

**Furnished by**

**Date**

**Purchase Order Change Required**

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

NOTICE TO SUPPLIER: Permission to deviate from the Terms and Conditions of the Purchase Order will be authorized only by a Purchase Order Change. The SIR shall be completed according to the instructions contained on the next sheet.
SUPPLIER INFORMATION REQUEST INSTRUCTIONS

USE THIS FORM ONLY WHEN AN APPROVED WRITTEN RESPONSE IS NECESSARY.

Written response may not necessarily be on this form.

1. Fill in all spaces above the double horizontal line (except the SIR No. will be assigned by the Engineers). Instructions to the Supplier for the purpose and use of the SIR, including the mailing address are contained in the specification or purchase documents. The "Proposed Solution" for the request should be clearly stated. Each accompanying document should be listed.

2. The SIR should be prepared when information or approval is required, as follows.

Type1 - Approval of Supplier’s suggested changes to technical requirements is requested.

Type2 - Approval of a Supplier’s proposed nonconformance disposition “Accept-as-is” and/or “Repair” is requested. This type is used only if required by the specification.

Type3 - Additional technical information relating to purchase documents is needed. Please do not use to request non-technical information, or to request technical information if no documentation is needed. Use a phone whenever possible in this case.