EXHIBIT D - TECHNICAL SPECIFICATION

D.7 BLAST DOOR

D.7.1 REFERENCE CODES AND STANDARDS

All work shall be performed according to the following codes and standards, as applicable:

<table>
<thead>
<tr>
<th>Code/Std.</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>AISC</td>
<td>Manual of Steel Construction</td>
</tr>
<tr>
<td>ASEM</td>
<td>A36 Specification for Structural Steel</td>
</tr>
<tr>
<td>ASME</td>
<td>NQA-1 Quality Assurance Requirements for Subpart2.2 Packaging, Shipping, Receiving, Storage and Handling of items for Nuclear Power Plants.</td>
</tr>
<tr>
<td>ANSI/AWS</td>
<td>D1.1 Structural Welding Code–Steel</td>
</tr>
<tr>
<td>NCIG-01</td>
<td>Visual Acceptance Criteria For structural Welding At Nuclear Power Plants.</td>
</tr>
<tr>
<td>KS</td>
<td>D3503 Rolled Steel for General Structure</td>
</tr>
<tr>
<td>KS</td>
<td>D3515 Rolled Steels for Welded Structure</td>
</tr>
</tbody>
</table>

D.7.2 QUALITY CLASS REQUIREMENTS

All work performed under this section, quality class shall be "T"

D.7.3 MATERIALS FURNISHED BY OWNER

N/A
D.7.4 MATERIALS FURNISHED BY CONTRACTOR

A. The contractor shall furnish blast doors, and all labors, equipment and supervision service for the installation of the blast doors.

B. Whether specified or not, the Contractor shall furnish and install any other miscellaneous hardware, material, and equipment required to properly install and test Contractor furnished material.

D.7.5 CONTRACTOR SUPPLIED MATERIAL SPECIFICATION

Refer to D.7 Attachment1.

D.7.6 SERVICE CONDITIONS/DESIGN REQUIREMENTS

N/A

D.7.7 FABRICATION

N/A

D.7.8 RECEIVING, HANDLING AND STORAGE

A. The receiving, handling, and storing of blast doors shall be according to manufacturer’s published instruction and ASME NQA-1, Subpart2.2 Level B.

D.7.9 FIELD OPERATIONS

A. INSTALLATION

1. The Contractor shall furnish all labor, supervision, tools, and necessary equipment for the installation of blast doors according to approved drawings, instructions and manufacturer’s recommendations.
2. Before the start of installation, openings and surfaces to receive the blast doors shall be inspected for any conditions that would adversely affect the work. Any adverse conditions found shall be corrected before proceeding with the installation.

3. Doors shall be installed in accordance with accepted drawings, manufacturer’s instruction, specifications and specified herein. Doors shall be installed true and square with the openings, shall operate freely and easily, and shall be aligned and balanced. The mechanism shall be thoroughly lubricated and the entire installation left in operating condition.

4. Welding shall be performed only by welders or operators who have been qualified according to Section 5 of ANSI/AWS D1.1. The qualification test records shall be maintained and certified by the Contractor, and shall be accessible to Owner during the course of work covered in this Contract. Welding procedures and qualification records shall be submitted according to Appendix 4D1.

B. DRAWINGS
Refer to D.7 Attachment 1T.03.4

D.7.10 INSPECTION AND TESTING

A. The entire installation of blast doors shall be subject to inspection by Owner’s inspector at any times during the course of the work. Any defective or improper work shall be replaced, repaired, or otherwise made good to the satisfaction of Owner, at the Construction’s expense.

b. Structural steel welds shall be visually examined, unless otherwise specified. Visual examination acceptance criteria for the structural steel welds shall be in accordance with the requirements of NCIG–01.
D.7.11 SUBMITTALS/QUALITY VERIFICATION REPORTS AND RECORDS

A. DRAWING, DATA AND PROCEDURES

1. Shop detail drawing and assembly drawings.

2. General welding procedure including welding procedure specification (WPS) and Procedure Qualification Report (PQR)

3. A work plan procedure (WPP) and quality control instruction (QCI) for blast doors shall be submitted to Owner for approval.

B. QUALITY VERIFICATION REPORTS AND RECORDS

1. Inspection and test reports shall be submitted to Owner in which all characteristics required by the specifications appear on a checklist. All inspection and test shall be performed in accordance with the approved Quality Control Instructions and the results recorded.

2. Supplier shall submit the Certificate of conformance stating that the installation is according to Owner’s furnished engineering and shop drawing and the requirements of this Contract.

D.7.12 MEASUREMENT AND PAYMENT

Measurement for payment for blast doors and accessories will be the number of doors installed and accepted by Owner.
BLAST DOOR (Manual Steel Type)

D.7 – ATTACCMEN 1

BLAST DOORS
### TECHNICAL SPECIFICATIONS

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<td>C. NAMEPLATE IDENTIFICATION</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>C. FABRICATION</td>
<td></td>
</tr>
<tr>
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<td>D. COATING WORK</td>
<td></td>
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</tbody>
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A. GENERAL
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TECHNICAL SPECIFICATIONS

T.01 SCOPE

A. WORK INCLUDED

1. Supplier shall design, manufacture, furnish and deliver the door assemblies and related items to F.O.B. jobsite and unloading in accordance with this specification the following:

2. The work to be performed under this specification includes, but is not limits to the following.

   a. Fabrication of blast door assemblies, and hardwares including locking device.

   b. Shop priming, finish coating and delivery of the coating materials for touch-up as described on Appendix 4G2.

   c. Inspection and performance testing

   c. Furnishing of Quality Verification Documents.

3. Supplier shall furnish one lot of all special tools required for adjustment, maintenance and dismantling of the equipment. Tools shall be new and of first class quality. Tools shall be shipped in a separate suitable container clearly marked with the name of the equipment.

4. Supplier shall furnish one(1) lot of Spare Parts required during installation, start-up, and 2 years of normal operation. All requirements shall be applied equally to the spare parts of the specified equipment. All documentation for spare parts shall be submitted in the same manner as for original parts.
5. When requested by Buyer, supplier shall furnish the services of competent technical advisor(s) who shall provide technical advice, guidance and assistance in the erection and testing of the equipment furnished under this specification, as required for the placement of the equipment in successful operation by the Buyer’s personnel.

6. Supplier shall furnish all labors, supervision, materials, tools, service, equipment, delivery, and perform all work required to make a complete assembly of blast doors, frames, and hardware, as specified herein and shown on the Buyer’s final engineering design drawings. Any discrepancies must be called to the attention of the Buyer.

B. RELATED WORK NOT INCLUDED

The following work will be performed by others:

1. Embedded plates in concrete for door frame attachment

T.02  ABBREVIATIONS AND DEFINITIONS

1. Quality Class T

This class is assigned to those items, or portions of structures whose failure could reduce the functioning of any safety related plant feature(Q_Class) to an unacceptable level.

2. Seismic Category I structures, systems, and components are those that are designed to remain functional in the event of a Design Basis Earthquake(DBE).
T.03 SUPPLEMENTS, CODES, STANDARDS AND QUALITY REQUIREMENTS

A. GENERAL

Supplier shall control the quality of Goods and services to meet the requirements of the Specification, applicable codes and standards and other procurement documents.

B. SUPPLEMENTS

1. The supplements listed herein form a part hereof.

2. References throughout the Technical Specifications Section or the Design Drawings to specific supplements which are among those listed herein, and/or to specific Articles or Paragraphs of the supplements listed herein are for convenience only and shall not relieve Supplier from all obligations of all requirements of other applicable supplements listed herein, or from all other specific Articles and Paragraphs indicated.

3. Response Spectra Curves(See Supplement 1)

<table>
<thead>
<tr>
<th>Figure No</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>WTRF Building--EL.95--Horizontal A–C Direction</td>
</tr>
<tr>
<td>2</td>
<td>WTRF Building--EL.100--Horizontal A–C Direction</td>
</tr>
<tr>
<td>3</td>
<td>WTRF Building--EL.95--Horizontal A–C Direction</td>
</tr>
<tr>
<td>4</td>
<td>WTRF Building--EL.100--Horizontal A–C Direction</td>
</tr>
<tr>
<td>5</td>
<td>WTRF Building--EL.95--Vertical Direction</td>
</tr>
<tr>
<td>6</td>
<td>WTRF Building--EL.100--Vertical Direction</td>
</tr>
</tbody>
</table>

4. Design Drawings

<table>
<thead>
<tr>
<th>Number</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>8609-27000-5035-06</td>
<td>Special Door Details</td>
</tr>
</tbody>
</table>
5. Appendices (See Project Standard Appendix)

Appendix 4A1  Quality Assurance Program Requirement

Appendix 4I  Dynamic Qualification Criteria for Safety Related Equipment

Appendix 4G2  Requirement for Coating Service Level II Equipment and Components

Appendix 4K5  Welding Requirements for Structural Steel (AWS)

C. INDUSTRY CODE AND STANDARD EFFECTIVE DATE

All codes and standards shall be the edition in effect as of December 31, 1999, unless indicated otherwise.

D. INDUSTRY CODES AND STANDARDS

The WORK shall conform to the applicable requirements of the following documents and applicable supplements (Which are referenced herein and not attached):

<table>
<thead>
<tr>
<th>Sponsor</th>
<th>Number</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>AISC</td>
<td></td>
<td>Manual of Steel Construction</td>
</tr>
<tr>
<td>ASTM</td>
<td>A36</td>
<td>Specification for Structural Steel</td>
</tr>
<tr>
<td>ASTM</td>
<td>A607</td>
<td>Steel, Sheet and Strip, High-Strength, Low-Alloy, Columbium or Vanadium, or both, Hot-Rolled and Cold-Rolled.</td>
</tr>
<tr>
<td>ASTM</td>
<td>A108</td>
<td>Steel Bars, Carbon, Cold Finished, Standard Quality</td>
</tr>
</tbody>
</table>
BLAST DOOR (Manual Steel Type)

ASTM D1056 Flexible Cellular Materials Sponge or Expanded Rubber
ASTM D2000 Rubber Products in Automotive Applications
ANSI N510 Testing of Nuclear Air-Cleaning Systems
AWS A5.1 Covered Carbon steel Arc-Welding Electrodes
ASME NQA-1 Quality Assurance Requirements subpart2.2 for Packaging, shipping Receiving storage and Handling Of Items for Nuclear Power Plants.
ANSI/AWS D1.1 Structural Welding Code-Steel
ASNT SNT-TC-1A Personnel Qualification and Certification in Nondestructive Testing
NCIG-01 Visual Acceptance Criteria For Structural Welding at Nuclear Power Plants.
KS D3503 Rolled Steels for General Structural
KS D3515 Rolled Steels for Welded Structural

E. QUALITY REQUIREMENTS

Work performed under this specification shall be quality class "T"

T.04 SUBMITTALS

A. DRAWINGS, DATA AND PROCEDURES

1. Engineering design calculations, certified by a Registered Professional Engineer, to substantiate that door assemblies are constructed to withstand the specified operating pressures and seismic loads.
2. Supplier’s quality assurance and quality control program.

3. Erection Information
   a. Supplier shall, when requested, furnish to the Buyer for the erection of the equipment, a detailed scope of the work involved in the complete erection of this equipment, including all accessories and appurtenances furnished therewith.

   b. This information shall include all necessary drawings and a comprehensive outline as to the extent of field fabrication required, and as to all temporary false-work, scaffolding, blocking, shoring, heating, disassembling, reassembling, welding, bolting, cleaning, checking, inspection, painting, testing, etc., required to be done by the Contractor.

4. Detailed shop drawings and descriptive data for each type of door assembly, indicating dimensions, fabrication and installation details, materials and finishes. Descriptive data shall include handling, storage and definitive installation instruction, together with complete parts list cross-referenced to drawings.

5. Door Manufacturer’s specifications, including specifications covering components supplied by Sub-suppliers.

6. Shop welding methods and procedures.

7. Airtight testing procedures.

8. Material Test Report including gasket material.


13. Spare parts list.
14. Handling, storage instruction.
15. Technical data for used coating system and manufacturer’s name

B. QUALITY VERIFICATION REPORTS AND RECORDS

1. Supplier shall submit a certificate of conformance stating that all work performed under this section meets the requirements of this contract.

2. Inspection and test reports shall be submitted to Owner in which all characteristics required by the specification appear on a checklist. All inspection and test shall be performed in accordance with the approved Quality Control Instructions and procedures, and the result shall be recorded.

T.05 DESIGN REQUIREMENTS

A. GENERAL

1. Doors, frames, and related components and accessories, including hardwares shall be designed, fabricated, and installed to resist the blast pressure and seismic loads specified herein after, acting simultaneously. Doors shall be operable before and after the blast and/or seismic incident.

2. Blast door numbers and locations.

<table>
<thead>
<tr>
<th>Door No.</th>
<th>Drawing No.</th>
<th>Drawing Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>SD-1</td>
<td>8609–27000–5036–02</td>
<td>Special Door Schedule</td>
</tr>
</tbody>
</table>
B. STRESS ANALYSIS AND DESIGN:

1. The following design loads and dynamic load factors are to be considered.
   
a. \( D \) = Dead/Gravity Loads  

b. \( P_o \) = Normal Operating Pressure: 1/4 inch water gage negative pressure  

c. \( P_a \) = Accident Condition Pressure: 10kPa differential  

d. \( DLF \) = Dynamic Load Factor for Accident Pressure: 2.0  

e. \( E \) = Seismic Loads(DBE, SDE)  

   Doors shall be designed to withstand the Design Base Earthquake(DBE) or Site Design Earthquake(SDE) without failure. Seismic loads are to be calculated utilizing the Response Spectra Curves given in Supplement1. Two orthogonal horizontal components and one vertical component shall be considered simultaneously. The vector sum or square root of the sum of the square (SRSS) may be used in combining the seismic stresses in the design.

2. The following max. allowable design stresses are to be used:
   
a. Normal loading combination = AISC allowable  

b. Service environmental loading condition and extreme environmental loading condition = 1.6AISC allowable  

c. Abnormal/Severe environmental loading condition = 1.7 AISC allowable. 
   For case c and d, the allowable design stress shall not exceed the following.
BLAST DOOR (Manual Steel Type)

(1) 0.95 Fy for flexure

(2) 0.95 Per for compress (Per is the critical buckling load for elastic or inelastic structural stability.

(3) 0.95Fy 1/3 for shear

3. The following loading combinations are to be used:

a. Normal combination
   \[ D + 1.0 \text{ Po} \]

b. Severe environmental condition
   \[ D + 1.0 \text{ Po EbBE} \]

c. Extreme environmental condition
   \[ 1.0 D + 1.0 \text{ Po } + \text{ ESDE} \]

d. Abnormal/Severe environmental loading condition
   \[ 1.0 D + 1.0 \text{ EDBE } + 1.0 \text{ Pa} \]

e. Abnormal/Extreme environmental loading condition
   \[ 1.0 D + 1.0 \text{ ESDE } + 1.0 \text{ Pa} \]

Note: A dynamic load factor (DLF) needs to be applied to Pa as given above.

4. allowable leak rate: 0.1 scfm (standard cubic feet per minute) at 10kPa differential
5. The equipment shall remain functional during and after the Design Basis Events specified herein.

6. The supplier shall demonstrate the capability of the equipment to sustain the forces resulting from the specified Design Basis Event by qualifying the equipment in accordance with the requirements of Appendix 4 I.

7. The characteristics of the Design Basis Event are given in the response spectra curves which are included as Attachment A to Appendix 4 I.

8. The damping factors shall be as follows unless Supplier justifies higher values:

<table>
<thead>
<tr>
<th>Event</th>
<th>Damping Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Base Earthquake</td>
<td>2 %</td>
</tr>
<tr>
<td>Site Design Earthquake</td>
<td>3 %</td>
</tr>
</tbody>
</table>

C. NAME PLATE IDENTIFICATION

Each blast door assembly shall be furnished with stainless steel nameplate mounted on one face of the door, with following information labeled:

1. Manufacturer
2. Serial job number
3. Specification Number 8609-27000-TS-A564
4. Tag number (as indicated on door schedule on the drawings).
T.06 MATERIALS, FABRICATION AND COATING

A. GENERAL

Materials and fabrication not specifically covered by this specification shall be manufacturer's standard, suitable for the application. All materials and fabrication will be subject to review by the Buyer.

B. MATERIALS

1. Steel Plates and shapes

   1. Steel plates and sheets shall conform to ASTM A36 and ASTM A607 or KS D 3505 SS400 (for \( t \leq 22 \)mm) and KS D3515 SM400 (for \( t > 200 \)mm). Bars shall be ASTM A108 Gr.1018 and supplied with certification stating that properties of the material are within the allowable ranges as covered by the applicable specification.

2. Gaskets

   Gasket materials shall meet all service conditions including accident temperatures specified in this specification. Gasket material shall conforms to the requirements of ASTM D2000 or ASTM D1056.

3. Threshold

   Threshold shall be fabricated from steel plate conforming to ASTM A36 or KS D3503. Size shall be governed by design.
BLAST DOOR (Manual Steel Type)

4. Hardware

a. Hinges: Each door shall be equipped with a minimum of one pair of hinges designed to carry the weight of the complete door assembly. The bottom hinge shall be designed to carry the entire axial thrust load plus the required radial load. The top hinges shall be designed to carry only the required radial load. Hinges shall be steel weldments equipped with radial and thrust roller bearings. Provision shall be made for easy lubrication of hinges.

b. Latching Mechanism: The multi point latching device shall consist of a minimum of four gear-driven locking pins designed to withstand applicable loadings and to cam the door into position against the gaskets to obtain an effective seal, and operable for both sides of the door.

c. The blast door shall be provided with pad lock or dead bolt by key from outside (see design drawing for key side locations).

5. Each door assembly shall be provided with a complete set of emergency spare parts including, but not limited to:

a. Gasket Adhesive
b. O-ring Seals
c. Gaskets
d. Latch Mechanism Shaft Seal Cartridge.

C. FABRICATION

1. Fabrication shall be in accordance with the Supplier’s accepted design and as shown on Supplier’s detail drawings. All equipment, materials, and work shall comply with applicable codes. All workmanship shall be of the highest quality consistent with the intentions of this specification.
BLAST DOOR (Manual Steel Type)

The Supplier shall repair, replace, or otherwise make good any defects in design, workmanship, and material appearing in the work after product is accepted by the Buyer. This shall include reimbursement to Buyer for any extra labor or transportation cost incurred in making any corrections and to which the Supplier has agreed.

3. The door panels for each opening shall be of similar construction, flush face of a solid steel plate. Doors shall have a degree of flatness that will allow proper seating around the entire perimeter.

3. Each door shall be equipped with compressible gaskets to provide a seal around the perimeter of the door. Gasket shall be of a design which will permit easy adjustment, maintenance, and replacement.

4. Each door panel shall be equipped with permanently installed or removable lifting lugs, or other provision for handling and erecting doors.

5. Moving parts shall operate freely and smoothly without binding, sticking, or excessive clearance. Bearing surfaces of moving parts shall be smooth free from irregularities that would interfere with operation of the door. The multi point latching device shall consist of the required number of gear driven locking pins, designed to withstand applicable loading and to cam the door into closed position against the gaskets.

6. Welding and welders shall conform to applicable requirements and qualification of AWS D1.1 or ASME Section IX. Cost of qualification test shall be borne by Supplier. Welding procedures and qualification records, other than those listed in AWS D1.1 Appendix 4K5 Section IX as pre-qualified, shall be submitted to Buyer for review before proceeding.
7. Each door panel shall be opened inside and seated on the door stop seal around the frame for good air-tightness in case of accidental relieving of blast pressure.

8. Flatness tolerance and door plumb tolerance shall be 1/16 inch per 7 feet on doors.

D. COATING WORK

1. The exterior surfaces of the blast door and frames shall be prepared and coated in accordance with the requirements of the Appendix 4G2.

2. The exterior surfaces shall be coated with epoxy primer and epoxy finish in accordance with Appendix 4G2, paragraph 5.1.b.

3. Prime coat color shall be manufacturer’s standard, and the finish color shall be Munsell No. 5Y 7/6.

T.07 SHIPPING, HANDLING, STORAGE, PACKING AND MARKING

A. GENERAL

1. The items procured by this specification are to be shipped, handled, stored, packed and marked in accordance with applicable requirements specified in this specification, manufacturer’s published instruction and Subpart 2.2 of ASME NQA-1, Level B.

2. All door assemblies shall be marked and identified with Buyer's door numbers as indicated on paragraph T.05.C.
T.08 INSPECTION AND TESTING

A. GENERAL

1. Supplier shall conduct and be responsible for the shop inspections and shop tests called for in the Specification as well as the applicable codes and standards, and shall furnish all facilities necessary for the performance of such tests.

2. Buyer has the right to inspect and witness Supplier’s manufacturing and testing operations for the equipment purchased in accordance with Sections 1 and 2.

3. Supplier shall submit records and reports for all tests and inspections required by this Specification. These records and reports shall be prepared promptly after each test or inspection and shall be transmitted to the Buyer prior to shipment of the equipment to the Project site.

4. Buyer shall be given the opportunity to witness the final inspection of all equipment prior to the release for shipment.

B. INSPECTION AND TEST

1. Shop Testing: Each type door unit shall be shop leak tested pneumatically in accordance with ANSI N510 at a design pressure differential of 3.0psi. Air leakage shall not exceed 0.1 cubic feet per minute per door unit.

2. All welds shall be nondestructively examined by magnetic particle or liquid penetrate examination in accordance with procedures and accepted in ANSI/AWS D1.1 Appendix 4K5 or ASME Section IX. Any required grinding of welds shall be done before nondestructive examination (NDE).
3. Personnel performing NDE shall be qualified in accordance with ASNT SNT-TC-1A.

4. Nondestructive examination procedure shall be submitted to Buyer for acceptance. Results of NDE shall be shipped with the fabricated components.

5. Structural steel welds shall be visually examined, unless otherwise specified. Visual examination acceptance criteria for the structural steel welds shall be in accordance with the requirements of NCIG-01.

6. Doors shall be manually operable by normal means, without the use of tools or extra effort after each test. If the assembly fails, it shall be rejected. Rejected assemblies shall be replaced with new ones or reworked to the satisfaction of the Buyer. New or reworked assemblies shall be retested. Gasket materials shall be tested and certified by an independent testing laboratory to meet all specified conditions.

7. Buyer has the right to select any additional test specimens of material being provided and to require tests to be made by the Supplier. If the tests prove to be satisfactory, the associated cost will be paid by the Buyer. If the tests prove unsatisfactory, the associated costs will be paid by the Supplier.

8. Inspection of the material/equipment shall be at the Supplier's/Sub-supplier's factory. Materials/equipment shall not be prepared for shipment or shipped before the Buyer has either inspected the materials/equipment or waived inspection. The inspection or waiving of inspection by the Buyer at the factory shall in no way relieve the Supplier of the responsibility of furnishing materials/equipment in accordance with this specification.
RESPONSE SPECTRA CURVES

Figure 1. WTRF-FRS at Elevation 95.0 Horizontal A–C Direction
Blast Door (Manual Steel Type)

Figure 2. WTRF-FRS at Elevation 100.0 Horizontal A–C Direction
Figure 3. WTRF-FRS at Elevation 95.0 Horizontal B-D Direction
Figure 4. WTRF-FRS at Elevation 100.0 Horizontal B-D Direction
Figure 5. WTRF-FRS at Elevation 95.0 Vertical Direction
Figure 6. WTRF-FRS at Elevation 100.0 Vertical Direction