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Name / Signature

Date

Approved by :

Name / Signature

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T.01 \textbf{SCOPE}

A. \textbf{WORK INCLUDED}

1. This specification covers the detail design, testing and furnishing of radiation shield doors.

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

   a. Furnish and fabricate the complete assembly of radiation shield doors, hangers, hanger and guide rails, posts and beams for hanger supports, rollers, hardware, seals, door stops and other accessories.

   b. Lead lined steel door panels.

   c. Chain or wire rope motor driven assemblies.

   d. Electrical wiring between limit and control switches, motor starters, safety devices on leading edge of door, operator motors and conduit and fittings.

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

   f. Push button stations with key-operated control stations, temporary cylinders and keys for electric door control.

   g. Key-operated control stations with temporary cylinders and keys for access control of the motors with clutches.

   h. Special tools and equipment for installation of the various lead-core steel structures.

   i. Drawings and instructions to enable handling and installation of the lead-lined steel doors. Each major component shall be labeled on the drawings as to its weight and its lifting points.

   j. Services of a qualified field representative to advise on the proper handling and installation of the lead-lined steel doors in the field.
RADIATION SHIELD DOORS

B. RELATED WORK NOT INCLUDED

The following work will be done by others:

1. Embedded plates for hangers of radiation shield doors.
2. Wiring of power supply to motor operator and pushbutton station.
3. Cylinders and keys for key-operated control stations.

T. 02 SUPPLEMENTS, CODES, STANDARDS AND QUALITY REQUIREMENTS

A. GENERAL

Seller 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 Design Drawings are for convenience only and shall not relieve the seller from all the obligations of other applicable listed or from all other specific Articles and Paragraphs indicated.
3. Design Drawings

<table>
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<tr>
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4. Reference Drawing

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5. Appendices (See Project Standard Appendix)

Appendix 4N Standard Spec. for A.C Motors—Squirrel Cage Type
Appendix 4G2 Requirements for Coating Service Level II Equipment and Components.

C. INDUSTRY CODE AND STANDARD EFFECTIVE DATE

All codes and standards shall be the edition in effect as of December 31, 1993 unless indicated otherwise.

D. INDUSTRY CODES AND STANDARDS

The materials shall conform to the applicable requirements of the following documents and supplements

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NCIG-01 Visual Acceptance Criteria for Structural welding at Nuclear Power Plants

E. QUALITY REQUIREMENTS

Work performed under this specification shall be quality class "R".

T. 03 SUBMITTALS

A. DRAWING, DATA AND PROCEDURES

1. The Contractor shall submit shop drawings of each door assembly, details of attachment, location of hardware, materials, guides, accessories and motor mounting details. Shop drawings shall clearly show required clearances and interface points.

2. Wiring diagrams including control wiring and logic diagrams for electric motor controls.

3. Manufacturer's control wiring and catalog data for assemblies.

4. Manufacturer's standard specifications and data sheets describing physical properties of lead.

5. Engineering design calculations verifying that the radiation shield door conforms to the requirements of this specification.

6. Manufacturer's detailed installation, operating and maintenance instructions with spare parts list.

7. Test procedures for all moving parts, operable equipment, seals and radiation shield.

8. Seller shall, when requested. Submit the structural calculations which Consider dead and wind loads.

B. QUALITY VERIFICATION REPORTS AND RECORDS

The contractor shall furnish a Certificate of Conformance stating that all work performed under this section meets the requirements of this Contract.
T. 04 DESIGN REQUIREMENTS

A. DESIGN LOADS

1. Wind load: Unless otherwise indicated, doors shall be designed to withstand a minimum wind velocity of 45m/sec.

The maximum deflection of the door under pressure loading shall be less than 1/180 of the width span.

2. Operating load: All exterior doors shall be designed to operate under a minimum of 10psf load applied over the entire area of the door.

agancy's rating, temperature, serial no. etc. as indicated on Design Drawing.

B. RADIATION SHIELD DOORS

1. Motor operators: Electric motor operators and control equipment shall be according to the industrial standards and shall be approved by the Owner before fabrication except for the following.

a. Gearing: Operator gearing shall be high efficiency worm gearing, running in an oil bath, complete with spring-set 460 volt or 120 volt AC solenoid operated brake, and shall be completely protected from interior atmospheric dust and moisture.

b. Motors and controls.

b. 1 Motors: Shall be high starting orque, 460 volt, three-phase, 60Hz, squirrel-cage, and sufficient power to operate doors at an approximate speed of 1 foot per 1 second.

The motors shall meet the following requirements.

- Locked rotor current shall not exceed 650%
- Service factor shall be 1.15.
- Motor shall accelerate the load of 80% rated voltage
- Motor shall be rigid such that the required normal operating brake horsepower is less than or equal to the motor nameplate and the max. expected brake horsepower does not exceed the service factor rating of the motor.
- For the outdoor motors greater than or equal to 3HP shall be furnished with space heaters. The space heaters shall be rated at 240V for 120V-AC operation.
c. Pushbutton stations: The push button stations shall be equipped with a key operated lockout. The lockout shall be interlocked to the security system. Unless otherwise indicated, each operator shall be equipped with a momentary contact heavy duty three-button pushbutton station, marked "OPEN" "CLOSE"- "STOP", and with limit switches, of type acceptable to the Owner, which will stop the motor at limits of travel. Pushbutton stations with panels shall be wall mounted on inside of the room and self standing on the exterior side, unless otherwise indicated.

d. Limit switches: Shall be heavy duty type, and shall be completely protected from interior atmospheric dust and moisture with provisions for terminating purchaser's 3/4" rigid steel conduit and #12 AWG stranded conductor wires. Limit switches shall be rated for 0.5A at 250V-DC inductive load or 5A at 120V-AC resistive load. Limit switches shall be provided for both opening and closing cycles. The limit switches shall control the full open and full closed position of the doors.

e. Control circuits: Shall be suitable for 120 volt AC operation. If control power for control circuits need 2,000VA or greater, the supplier shall provide a step down transformer 480-120V of adequate capacity. The transformer shall be equipped with incoming circuit breakers.

f. Brake: A brake shall be a manufacturer's recommended system and subject to the Owner's approval. The system shall provide function at least listed as below.

2. Weather stripping

a. Weather stripping shall be provided for doors, essentially continuous around each door as shown on design drawing for a weather tight, air tight seal.

3. Safety device

The leading edge of the radiation shield door shall be equipped with an electrical control device, the limit switches and the safety devices (stopper) to stop the door upon contact with an obstruction.

4. The motor operated radiation shield doors shall have a clutch device and a flush type door pull. The motor with clutch device shall be provided with a key-operated control station. The clutch device shall be provided to operate each door in case of power failure or removal of motor for inspection and servicing, and shall slip when the door is held by a 20-pound force.
5. The radiation shield door shall overlap the concrete opening by min. 10cm, and shall overlap an other active leaf by min. 6cm.

6. The rail size, support beam size and the wheel size shall be designed to withstand the door weight, its operating load and wind load.

T. 05 MATERIAL FABRICATION AND COATING

A. GENERAL

1. Material and fabrication shall be suitable for the design and operating conditions specified and shall be in accordance with the applicable requirements of this specification.

2. Material and fabrication not specifically covered by this specification shall be manufacturer's standard, suitable for the application.

B. MATERIALS

1. Radiation shield door shall be constructed of thk. 10mm steel sheet, both face, with a 9cm thick lead core brick or casting of full door face. Vertical and horizontal steel reinforcement shall be welded to the steel face plates.

2. Structural Steel shall conform to ASTM A36 or KS D3503 SS400.

3. Lead shall be chemical grade with 3% antimony in accordance with the requirement of ASTM B29 and have min. density of 11.0g/cm³.

4. Rail shall conform to KS B 8106.

C. DESIGN AND FABRICATION

1. For locations, wall material, door detail and size : see design drawings

2. Fabrication shall be in accordance with the Seller's accepted design and as shown on seller's detail drawings. All equipment, materials, and work shall comply with applicable code. All workmanship shall be of the highest quality consistent with the intentions of this specification. The Seller 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 Seller has agreed.
3. The configuration of the door shall be designed to prevent the radiation exposure.

4. The flatness and squareness of door shall be within 3mm.

5. 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 Seller. Welding procedures and qualification records, other than those listed in AWS D1.1. Appendix 4K5 ASME Section IX as prequalified shall be submitted to Buyers for review before proceeding.

D. COATING WORK

1. Both side of face sheets, all surfaces of internal stiffeners, reinforcing and other corrosive steel accessories forming an integral part of the door shall be prepared and coated in accordance with Appendix 4G2. The coating materials primer and finish, shall be in accordance with Appendix 4G2, Paragraph 5.1.b. Additionally, for outdoor exposed face sheets, one coat of urethane finish (D.F.T 1.5 – 2.5mils) shall be applied over epoxy primer and epoxy finish. All coating materials shall be from the same manufacturer. The color of finish coat shall be brown (Munsell No. 5Y 7/6).

T. 06 SHIPPING, HANDLING, STORAGE, PACKING AND MARKING

A. GENERAL
The items procured by this specification are to be shipped, handled, stored, packed and marked in accordance with applicable requirements specified in this specification and Part 2.2 of ASME NQA-2, Level B. Each door assembly and its container shall be marked and tagged with an opening number, building name, elevation, level door number, manufacturer, address, test number.

B. STORAGE AND HANDLING
The Seller shall provide storage and handling requirements at the jobsite in accordance with ASME NQA-2, Part 2.2 Level B.
T. 07 INSPECTION AND TESTING

A. GENERAL

1. Seller shall conduct and be responsible for the 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 seller's manufacturing and testing operations.

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

B. INSPECTION AND TESTS


2. All welds shall be nondestructively examined by magnetic particle or liquid penetration examination in accordance with procedures and accepted in AWS D1.1 Appendix 4K5.

3. Personnel performing NDE shall be qualified in accordance with ASNT. SNT-TC-1A.

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

5. Lead shall be tested for voids using radio-isotope Co 60 gamma-scanning or other approved method.