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NAVFAC PTS-D10 (June 2023)  
 ------------------------------  
Preparing Activity: NAVFAC SUPERSEDING PTS-D10 (September 2022)  
PERFORMANCE TECHNICAL SPECIFICATION  
  
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SECTION D10  
  
CONVEYING  
06/23

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NOTE: This section is intended to be used as a guide and contains requirements that are common to many different types of facilities. In addition, there may be special requirements for a particular project that are not addressed at all. The RFP preparer will need to incorporate additional information to address these special requirements in this PTS and corresponding Part 3 ESR. If the RFP Preparer chooses to delete building elements that are not required for the project, do not change the remaining Uniformat paragraph designations (example A102001). Uniformat designations are unique to the products they are assigned to. However, the subparagraphs numerical extension (example - 1.2 or a,b,c of the Uniformat designations may change if subparagraphs are deleted).  
  
This guide specification is formatted utilizing Uniformat II, an industry recognized standard, ASTM E 1557. When the RFP preparer chooses to add a paragraph that does not apply to an existing building element already included in the specification, refer to the Uniformat/WBS located on the NAVFAC Design-Build Website for a listing of Uniformat II designations and definitions.  
  
NOTE: The RFP preparer may view or hide the criteria notes in this PTS section by modifying the WORD preferences for "Hidden text". To view the criteria notes, choose "File" then "Option". Click "Display" then check the "Hidden text" box under "Always show these formatting marks on the screen". In the same section, check the box for "Print hidden text" under "Printing options" to print the criteria notes.  
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NOTE: This PTS Section covers Passenger Elevators and other Vertical Transportation Equipment (VTE).  
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**D10 GENERAL**

RFP Part 3 including the Engineering System Requirements (ESR) provide project specific requirements. The RFP Part 4, Performance Technical Sections (PTS) provide generalized technical requirements that apply to multiple facility types and include more requirements than are applicable to any one project. Therefore, only the RFP Part 4 requirements that apply to the project and further define the RFP Part 3 project specific requirements are required.

Comply with the requirements of UFC 1-200-01, *DoD Building Code*.

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NOTE: All new passenger elevators must comply with ABA Standards requirements. \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\***

**D10 1.1 DESIGN GUIDANCE**

Provide the design and installation in accordance with the following references. This Performance Technical Specification (PTS) adds clarification to the fundamental requirements contained in the following Government Standards. The general requirements of this PTS section are located in PTS Section Z10, *General Performance Technical Specification*.

Industry standards, codes, and Government standards referenced in the section text that are **not** found in the [Unified Master Reference List (UMRL)](http://www.wbdg.org/ffc/dod/unified-master-reference) in the [Federal Facility Criteria (FFC)](http://www.wbdg.org/ffc/federal-facility-criteria) at the [Whole Building Design Guide (WBDG)](http://www.wbdg.org/) website, are listed below for basic designation identification. Refer to the UMRL for full reference standard title and current document date. Comply with the required and advisory portions of the current edition of the referenced standard at the time of contract award.

**D10 1.1.1 Industry Standards and Codes**

Although some the following references are listed in the UMRL, they are repeated here for emphasis.

References publications in this RFP that refer to the "authority having jurisdiction" shall be interpreted to mean the "Contracting Officer."

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

|  |  |
| --- | --- |
| ASCE 7 | Minimum Design Load for Buildings and Other Structures |

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

|  |  |
| --- | --- |
| Safety Code for Elevators and Escalators | |
| ASME A17.2 | Guide for Inspection of Elevators, Escalators and Moving Walks |
| ASME A18.1 | Safety Standard for Platform Lifts and Stairway Chairlifts |
| ASME B20.1 | Safety Standards for Conveyors and Related Equipment |

AMERICAN WELDING SOCIETY (AWS)

|  |  |
| --- | --- |
| AWS D1.1 | Structural Welding Code Steel (NOT in Spec TEXT) |

NATIONAL FIRE PROTECTION ASSOCIATION

|  |  |
| --- | --- |
| NFPA 70 | National Electric Code |

**D10 1.1.2 Government Standards**

NAVAL FACILITIES ENGINEERING COMMAND (NAVFAC)

|  |  |
| --- | --- |
| NAVFAC P-307 | Management of Weight Handling Equipment |

NAVAL SEA SYSTEMS COMMAND (NAVSEA)

|  |  |
| --- | --- |
| T9074-AS-GIB-010/271 | Requirements for Nondestructive Testing Methods. |

US NATIONAL ARCHIVES AND RECORDS - OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (NARA/ OSHA) - Code of Federal Regulations (CFR)

|  |  |
| --- | --- |
| 29 CFR, Part 1910.23 | Guarding Floor and Wall Openings and Holes |
| 29 CFR, Part 1910.27 | Fixed Ladders |
| 29 CFR, Part 1910.179 | Overhead and Gantry Cranes |
| 29 CFR, Part 1910.306 | Specific Purpose Equipment and Installations |

U.S. DEPARTMENT OF DEFENSE (DOD) UNIFIED FACILITIES CRITERIA (UFC)

|  |  |
| --- | --- |
| UFC 1-200-01 | DoD Building Code (UFC 1-200-01 is a hub document that provides general building requirements and references other critical UFCs. A reference to UFC 1-200-01 requires compliance with the Tri-Service Core UFCs listed in the document.) |
| UFC 1-200-02 | High Performance and Sustainable Building Requirements |

**D10 1.2 PERFORMANCE VERIFICATION AND ACCEPTANCE TESTING**

Provide verification of satisfactory Conveying systems performance via Performance Verification Testing, as detailed in this section of the RFP.

**D10 1.2.1 Testing and Inspections for Elevators**

a. Conduct all testing and inspections in the presence of both the Elevator Specialist and a NAVFAC Certified Elevator Inspector. The Elevator Inspector must complete, sign and post the results of all tests and inspection results after successful completion of inspection and testing. The Contractor is responsible for all costs involved with reinspection and retesting required to correct discrepancies discovered during testing and the subsequent retesting required, including all costs and expenses incurred by the Government Furnished Inspector.

b. Testing Materials and Instruments  
Provide testing materials and instruments required for final inspection, including a current equipment calibration certification.

c. Field Tests for Elevators  
  
In addition to the tests required by AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) A17.1 AND ASME A17.2, perform the following:   
  
(1) Endurance Tests - Test each elevator for a period of one hour continuous run, with specified rated load in the car. Restart the one hour test period from beginning, following any shutdown or failure. During the test run, stop car at each floor in both directions of travel for standing period of 10 seconds per floor. Meet the requirements for Rated Speed, Leveling, Temperature Rise, and Motor Amperes testing specified herein throughout the duration of the Endurance test.   
  
(2) Speed Tests - Determine actual speed of each elevator in both directions of travel with rated load and with no load in elevator car. Minimum acceptable elevator speed is the Rated speed specified. Maximum acceptable elevator speed is 110 percent of Rated speed.   
  
(3) Leveling Tests - Test elevator car leveling devices for landing accuracy of plus or minus 1/4-inch (6 mm) at each floor with no load in car, symmetrical load in car, and with rated load in car in both directions of travel. Car sill must be level with landing sills.   
  
(4) Temperature Rise Tests - Determine temperature rise of elevator hoisting motor, motor-generator, exciter, and booster during full-load test run for one hour minimum. Under these conditions, maximum acceptable temperature rise must not exceed acceptable temperature rise indicated on manufacturer's data plate. Start test only when equipment is within 9 degrees F (5 degrees C) of ambient temperature.   
  
(5) Motor Ampere Tests - Measure and record motor amperage when motor is running and elevator is lifting at rated load and speed. Measure and record motor amperage at beginning and end of Endurance test. Test results must not exceed nameplate amperage when motor is running and elevator is lifting at rated load speed.   
  
(6) Balance Load for Electric Elevators Tests - Perform electrical and mechanical balance load tests of car and counterweight.  
  
(7) Automatic Shutoff Valve Tests - For hydraulic elevators, test the automatic shutoff valve twice. Once at beginning of acceptance test and again at conclusion of one-hour Endurance test to ensure consistent performance of shutoff valve, regardless of temperature of equipment and oil.   
  
(8) Perform miscellaneous tests called for in this Section.

**D10 1.3 DESIGN SUBMITTALS**

Provide design submittals in accordance with PTS Section Z10, *General Performance Technical Specifications*, Part 2 Section 01 33 10.05 20, *Design Submittal Procedures*, Facilities Criteria (FC) 1-300-09N, *Navy and Marine Corps Design Procedures*, UFC 3-101-01, *Architecture* and UFC 3-301-01, *Structural Engineering*. Provide design submittals that include the following items:

a. Elevators:

(1) Drawings. Show the design of the track beam system, including switches, principal dimensions, details of structural connections, all component details, and electrical one-line diagrams. Show clearances between elevator and building and identify interferences.

(2) Specification. Provide edited version(s) of the UFGS elevator specification(s) that are applicable to this project. Edit the UFGS's in accordance with restrictions of RFP Part 4 - PTS Section Z10 and refer to Part 2 Section 01 33 10.05 20, *Design Submittal Procedures* for format and further specification requirements. Edit UFGS only to add project specific information. Submit the applicable UFGS as a part of the Contractor originated design submittal, DO NOT submit RFP Part 4 - D10 as part of the design submittal.

If this RFP includes a type of elevator that is not covered in this D10 PTS Section and is specified in a Prescriptive Specification located RFP Part 5, include this Prescriptive Specification in the Contractor's design submittal without modification.

(3) Catalog Cuts. Include catalog cuts in addition to the UFGS sections for all major components. Mark and highlight all catalog cuts to identify all the specific components that are applicable to the project.

**D10 1.4 CONSTRUCTION SUBMITTALS**

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NOTE: Coordinate with PM and CM who will provide approval or surveillance of the elevator construction drawings and designate who has that responsibility in UFGS 01 33 00.05 20, Construction Submittal Procedures.  
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Submit construction submittals in accordance with PTS section Z10, *General Performance Technical Specifications*. In addition to the Z10 requirements, the Designer of Record (DOR) will approve the following construction submittals as a minimum:

a. Construction Submittals for Vertical Transportation Equipment (VTE)

(1) Elevator Construction Submittals   
  
In addition to the submittal requirements of ASME A17.1, provide the following submittals:  
  
Detail drawings must include dimensioned layouts in plan and elevation showing the arrangement of elevator equipment, accessories, supporting systems, anchorage of equipment and anchorage forces from seismic, gravity, impact, etc. loads, clearances for maintenance and operation; and details on hoistway, doors and frames, operation and signal stations, controllers, motors, guide rails and brackets, and points of interface with normal power, fire alarm system, HVAC or exhaust systems, and interface with emergency power systems. Drawings must show any revised building electrical system required to make supplied elevator system function as specified. Drawings must contain complete wiring diagrams showing electrical connections and other details required to demonstrate sequence of operations and functions of system devices. Drawings must include the appropriate sizing of electrical protective devices, which are frequently different from National Electrical Code standard sizes.

Submit one set of wiring diagrams in plastic or glass cover, framed and mounted in elevator machine room. Deliver other sets to Contracting Officer. Coded diagrams are not acceptable unless adequately identified.

(2) Construction Submittals for Facility Electronic Operation and Maintenance Support Information (eOMSI):   
  
Submit final submittals for eOMSI Submittal. After approval by the DOR and sign-offs by the elevator inspector, assimilate construction submittals into the OMSI manuals required under Part 2 Section 01 78 24.00 20, *Facility Data Workbook (FDW)*.

**D1010 ELEVATORS AND LIFTS**

Comply with the *UFC 3-490-06 Elevators* for the design and construction of elevators.

**D1010 1.1 QUALIFICATION OF MANUFACTURER AND INSTALLER**

Provide elevator by manufacturer regularly engaged in the manufacture of elevator systems. Manufacturer must either install elevator system or provide letter of endorsement certifying that installer is acceptable to manufacturer. Installer is required to be regularly engaged in installation and maintenance of elevator systems.

If the project is located in the State of Hawaii, perform work involving the installation or repair of elevator equipment under the supervision of a person who is licensed in elevator repair in the State of Hawaii or who possesses the equivalent experience. Furnish data to the Contracting Officer for verification that the person exercising direct supervision of the work possesses such experience.

**D101001 GENERAL CONSTRUCTION ITEMS**

Comply with ASME A17.1 AND ASME A17.2 in their entirety, and additional requirements specified herein. Install in accordance with manufacturer's instructions, ASME A17.1, DoD Architectural Barriers Act (ABA) and Deputy Secretary of Defense (DEPSECDEF) Memorandum (dated October 31, 2011), and NFPA 70. Do not cut or alter Structural Members. Restore damaged or defaced work to original condition. Include recesses, cutouts, slots, holes, patching, grouting, and refinishing to accommodate installation. Use core drilling to drill new holes in concrete ensuring that no existing reinforcing is cut. Finish work to be straight, level, and plumb. During installation, protect machinery and equipment from dirt, water, or mechanical damage. At completion, clean all work, and repair any prefinished items that have been damaged during the performance of the work.

Elevators that are intended to carry personnel other than one (1) operator must be classified as a passenger elevator. Passenger elevators that are intended to carry furniture or equipment, must have an oversized cab. Refer to the Project Program for the type of elevator required.

**D101001 1.1 TRAFFIC ANALYSIS**

Provide a traffic analysis in accordance with criteria established by a nationally recognized elevator manufacturer's association and conduct interviews with the User to determine the following:

a. Passenger

b. Rated load

c. Rated speed

d. Travel length

e. Number of stops

f. Number of hoistway openings

g. Car platform, car inside, and hoistway door opening dimensions

h. Hoistway Door Types

i. Car Door type

**D101001 1.2 ELEVATOR MACHINE ROOM**

Provide a machine room for every elevator. Locate the elevator machine and controller in the Elevator Machine Room.

**D101002 PASSENGER ELEVATORS**

**D101002 1.1 HOISTWAY AND CAR EQUIPMENT**

**D101002 1.1.1 Car and Counterweight Guide Rails and Fastenings**

Paint rail shanks with one coat of black enamel. Only T-section type guide rail is acceptable.

**D101002 1.1.2 Pit Channel**

Provide pit channel for anchorage of main guide rail brackets and also for anchorage of counterweight guide rail brackets and buffer for electric elevators. Each channel must span distance between guides. Fully grout both pit channels on completion of guide rail and buffer installation.

**D101002 1.1.3 Pit "STOP" Switch**

Provide push/pull type pit "STOP".

**D101002 1.1.4 Wiring and Traveling Cables**

Suspend cables by means of self-tightening webbed devices.

**D101002 1.2 CAR AND LANDING DOOR EQUIPMENT**

**D101002 1.2.1 Infrared Curtain Unit**

Provide Infrared Curtain Unit (ICU) with multiple infrared beams that protect to the full height of the door opening. Extend minimum coverage from 2 inches (50 mm) off the floor to 70 inches (1778 mm) above floor level.

**D101002 1.2.2 Hoistway Entrance Frames**

Provide 14 gage (1.8 mm) thick #4 brushed stainless steel door frame unless directed otherwise by Contracting Officer. Solidly grout uprights of entrance ways to height of 5 feet (1500 mm).

**D101002 1.2.3 Car and Hoistway Landing Sills**

Car and Hoistway Landing Sill - Provide one piece cast solid white bronze or nickel silver entrance sill. Use same material for hoistway and car entrance sills. Solidly grout under full length of sill.

**D101002 1.3 IN-CAR AND LANDING FIXTURES**

**D101002 1.3.1 Car and Hall Buttons**

Provide recessed vandal-resistant push buttons of minimum 3/4-inch (19 mm) size satin-finish stainless steel with illuminating jewel center.

**D101002 1.3.2 Position and Direction Indicators**

Provide position and direction indicators in car and at each landing.

**D101002 1.3.3 Direction Audible Signals**

Provide audible signals in car and at each landing.

**D101002 1.4 CAR AND CAB EQUIPMENT**

**D101002 1.4.1 Roller Guides**

Provide coil-spring loaded roller guide assemblies in adjustable mountings on each side of car and counterweight frames in accurate alignment at top and bottom of frames.

**D101002 1.4.2 Certificate Window**

Provide 4 inch (100 mm) high by 6 inch (150 mm) wide certificate window in car operating panel for elevator inspection certificate.

**D101002 1.4.3 Cab Ventilation**

Provide natural and forced ventilation with two-speed fan.

**D101002 1.4.4 Protection Pads and Mounting Hooks**

Provide stainless-steel hooks and fire retardant protective pads for one elevator in a set.

**D101002 1.4.5 Car Enclosure**

Car Shell Return Panels, Entrance Columns, Cove Base, and Transom: Provide 14 gage (1.9 mm) minimum non perforated steel. Apply sound-deadening mastic on all exterior components.

Provide finishes for the elevator cab interior that are appropriate for the type of facility. Finishes must not exceed the flame spread rates mandated by ASME A17.1.

**D101002 1.4.6 Car Size**

Provide at least one elevator of a size and arrangement to accommodate an ambulance stretcher in the open, horizontal position. The minimum size of the ambulance stretcher used to design the elevator must be 24 inch by 84 inch (609.6 mm by 2133.6 mm) with not less than 5 inch (127 mm) radius corners. Identify all stretcher accessible elevators with the international symbol for emergency medical services (Star of Life).

**D101002 1.5 ELEVATOR CONTROLLER**

**D101002 1.5.1 Non-proprietary Controller**

**\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*   
NOTE: Use microprocessors for elevator logic control. However, solid-state microprocessor control is not desirable for any facility that is subject to an erratic building power supply, or at a remote location. In this situation, specify an electromagnetic switch, relay logic controller.  
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Provide micro-processor controllers from controller manufacturers who provide generic controllers that are designed to function with all or most manufacturers elevator equipment. The manufacturer of the controller must engage solely in the manufacture and sale of controllers to the elevator industry and not engage in the elevator installation, service, or maintenance. The follow controller manufactures comply with this requirement:

a. Elevator Controls Corporation, 3525 La Grande Boulevard, Sacramento, CA 95823

b. G.A.L. Manufacturing Corporation, 50 East 153th Street, Bronx, New York 10451

c. Motion Control Engineering, Inc., 11354 Whiterock Road, Rancho Cordova, CA 95742-6522

d. Virginia Controls, Inc., 2513 Mechanicsville Turnpike, Richmond, VA 23223

e. Computerized Elevator Control Corporation (Swift), 24 Empire Blvd., Moonachie, NJ 07074-1303

The following are required features of the generic micro-processor controllers and manufacturers training:

a. On-Board Diagnostic Panel

(1) Provide a non-proprietary micro-processor controller for each individual elevator and group controller. Provide an on-board diagnostic control and LCD display panel that allows unrestricted access to the comprehensive range of adjustable parameters necessary to perform installation, adjusting, service, maintenance, and testing of the elevator.   
  
(2) Provide LCD displays with the capability to display, monitor, and diagnose any and all fault logs, fault history, trouble calls, and diagnostics. Provide three (3) copies of the complete manufacturer's software program, with complete software documentation, that must enable the same level of unrestricted access to all controllers of the same make and model, regardless of the installation date or location.

b. External Port - For each individual elevator and group controller, provide a USB port or an RS 232 port that allows connection to an on-site portable laptop computer. Provide the same level of unrestricted access as the on-board diagnostic panel.

c. Repair Requirements - For repair of the microprocessor control system(s), provide maintenance tools, supporting computer software, and software documentation required for complete maintenance of elevator system including diagnostics and adjustments. On-board diagnostic panels must not require recharging to maintain their memory or authorization for use. Software must not require periodic reprogramming, or reauthorization. Store programs in non-volatile memory.

d. Training - The elevator controller manufacturer must offer and conduct technical support and factory training that is available to all state licensed elevator service providers qualified to bid on navy elevator maintenance service contracts. Include in the factory training all aspects of the installation, service, and maintenance of the elevator controller.

**D101002 1.6 OPERATIONAL CONTROLS**

**D101002 1.6.1 Independent Service**

Provide exposed key-operated switch in car operating panel to enable independent service.

**D101002 1.6.2 Hoistway Access Switches**

Provide key-operated hoistway access switch to permit limited movement of car at terminal floors for car positioning, operative only when "INSPECTION" switch in car operating panel is in the "INSPECTION" position. Locate switch 6 feet (1800 mm) above floor level, within 12 inches (300 mm) of hoistway entrance frame or with only ferrule exposed when located in entrance frame.

**D101002 1.6.3 Emergency Commandeering Service**

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NOTE: Emergency Commandeering Service (ECS) is used for priority elevator service. ECS is typically used in hospitals and in buildings with security requirements for the elevators.  
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Provide momentary pressure "ON-OFF" key switch and indicator light at all landings. Provide indicator lights that automatically illuminate during emergency service. Key must be removable only when key is in "OFF" position. Provide in accordance with ASME A17.1.

**D101002 1.6.4 Keys for Elevator Key Switches**

Provide minimum of twelve keys per unique cylinder used on all key switches for single elevator.

**D101002 1.7 MAINTENANCE AND DIAGNOSTIC COMPONENTS**

**D101002 1.7.1 Maintenance and Diagnostic Tools**

Provide all special tools and software necessary to service and maintain each elevator; deliver at time of final acceptance. Provide one of each tool for each elevator machine room.

**D101002 1.8 ADDITIONAL REQUIREMENTS FOR HYDRAULIC ELEVATORS**

**D101002 1.8.1 Hydraulic System**

Provide hydraulic system which operates at a maximum working pressure of less than 500 psig.

a. Scavenger Pump Unit - Provide a scavenge oil reservoir, with strainer and transfer pump. Provide a manual-reset pit flood switch to prevent pump operation if pit is flooded. Anchor pump and oil reservoir to the pit floor.

b. Pressure Piping and Accessories - Provide ASTM A 53/A 53M or ASTM A 106/A 106M, Schedule 80, black steel piping with ASME B16.9 or ASME B16.11 fittings for supply piping. Provide welded or threaded forged pipe fittings that are located between the pump control valve body and the cylinder inlet. Extend Schedule 80 piping from the pump control valve body, inside the pump unit, to the hydraulic cylinder in the hoistway. Provide dielectric union at each end of the "pump to cylinder" oil supply line. Provide hangers or supports for all piping.

c. Oil Temperature Device - Provide means to maintain oil temperature between 80 and 120 degrees F (27 and 49 degrees C) regardless of ambient temperature.

**D101002 1.8.2 Cylinder-Plunger Unit**

Provide a plunger of single-piece seamless steel construction. Provide threaded 1/4-inch (6 mm) bleeder valve at top of cylinder just below packing gland. Telescopic or inverted cylinder-plunger units are not acceptable. Provide cylinder with self-stabilizing mount that will support and hold cylinder plumb without the need for stabilization means at the bottom of the cylinder.

**D101002 1.8.3 Automatic Shutoff Valve**

Provide automatic shut-off valve in oil supply line as close to cylinder inlet as possible. Provide threaded pipe connections to the valve. Provide manual lowering feature on valve. Provide exposed adjustments of automatic shut-off valve with means of adjustment sealed by certified elevator inspector after being set to correct position and tested.

**D101002 1.8.4 Well Casing**

Line well with steel casing, minimum 1/4-inch (6 mm) wall with welded 1/2-inch (10 mm) steel bottom, set plumb. Install cylinder well casing plumb using spider bob method.

a. PVC Liner - Provide Schedule 80 PVC pipe liner with bottom cap and couplings; joints sealed watertight using PVC pipe manufacturer's recommended adhesive or heat welding methods. Provide liner inside diameter not less than 3-inch (76 mm) larger than elevator cylinder maximum outside diameter. Set PVC liner into well casing, centered and plumb. PVC liner may be provided as a manufacture’s applied liner or as a separate component.

b. Cylinder Installation - Install Cylinder plumb into PVC.

c. Cylinder Evacuation Tube - Provide a 3/4-inch (19 mm) PVC evacuation tube with strainer located within 6 inch (152 mm) of bottom of liner. Provide top of test tube with removable cap to exclude foreign matter.

d. Pressure Test - Test liner-cylinder assembly as a sealed unit. Provide safety relief valve set to relieve at 10 psig (69 kPag); 4.5 inch (114 mm) diameter dial pressure gage scaled for 0 to 50 psig (0 to 175 kPag) and calibrated to 0.5 percent accuracy; and an air pressure admission throttling and shutoff valve. Perform air pressure test in the presence of the Elevator Inspector. For safety, pressure test must only be performed when liner and cylinder are fully inserted and assembled in the well casing. Perform the test from remote location outside of the elevator pit.

e. Secure cylinder/PVC liner assembly as recommended by cylinder manufacturer.

f. Seal - Seal gap between steel well casing and PVC liner with foam insert strong enough to retain and support final grouting. Provide 3000 psi (21 MPa) grout to a minimum of 4 inch (102 mm) thickness and level top of final grouting with pit floor.

g. Containment - Protect exposed portions of hydraulic elevator oil supply line that are installed below ground, including portions encapsulated in concrete, or covered by construction, with continuous Schedule 80 PVC containment.

h. Provide layout diagram, foundation support details, and foundation loads.

**D109002 CONVEYORS**

Comply with ASME B20.1, *Safety Standards for Conveyors and Related Equipment*.

-- End of Section --