UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2021
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DIVISION 14 - CONVEYING EQUIPMENT

HYDRAULIC FREIGHT ELEVATORS

05/16

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USACE / NAVFAC / AFCEC / NASA	**UFGS-14 24 13 (May 2016)** **Change 1- 05/18**
Preparing Activity: NAVFAC	**Superseding** **UFGS-14 24 00 (August 2010)**

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2021
****

SECTION 14 24 13

HYDRAULIC FREIGHT ELEVATORS
05/16

****
NOTE: This guide specification covers the requirements for hydraulic freight elevators.

Adhere to UFC 1-300-02 **Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.**

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR)**.**
****

****
NOTE: All Army and Navy facility designs which include elevators shall comply with the "NAVFAC ITG 2013-01 Elevator Design". This guide is available from the NAVFAC facilitator (http://www.wbdg.org/ffc/navy-navfac/interim-technical-guidance-itg **) under Interim Technical Guidance.**
****

****
NOTE: For NAVY projects, any editing of non-bracketed requirements in this specification shall be approved through the NAVFAC FEC VTE Program Lead Certifying Official.
****

PART 1 GENERAL

1.1 REFERENCES

****

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

****

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME A17.1/CSA B44	(2019) Safety Code for Elevators and Escalators
ASME A17.2	(2017) Guide for Inspection of Elevators, Escalators, and Moving Walks Includes Inspection Procedures for Electric Traction and Winding Drum Elevators, Hydraulic Elevators, and Escalators and Moving Walks
ASME B16.9	(2018) Factory-Made Wrought Buttwelding Fittings
ASME B16.11	(2016) Forged Fittings, Socket-Welding and Threaded

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2020) Structural Welding Code - Steel

ASTM INTERNATIONAL (ASTM)

ASTM A53/A53M	(2020) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A106/A106M	(2019a) Standard Specification for Seamless Carbon Steel Pipe for

High-Temperature Service

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C62.41	(1991; R 1995) Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2018) International Building Code

NATIONAL ELEVATOR INDUSTRY, INC. (NEII)

NEII-1	(2000; R thru 2017) Building Transportation Standards and Guidelines, including the Performance Standards Matrix for New Elevator Installation

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2020; ERTA 20-1 2020; ERTA 20-2 2020; TIA 20-1; TIA 20-2; TIA 20-3; TIA 20-4) National Electrical Code
NFPA 70E	(2021) Standard for Electrical Safety in the Workplace
NFPA 72	(2019; TIA 19-1; ERTA 1 2019) National Fire Alarm and Signaling Code
NFPA 101	(2021) Life Safety Code

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-560-01	(2017, with Change 2, 2019) Operations and Maintenance: Electrical Safety

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

36 CFR 1191	Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines

1.2 SUBMITTALS

****

NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item if the submittal is sufficiently important or

complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

Choose the first bracketed item for Navy, Air Force, and NASA projects, or choose the second bracketed item for Army projects.

****

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Elevator System; G[, [_____]]

Elevator Components; G[, [_____]]

Elevator Machine; G[, [_____]]

Elevator Controller; G[, [_____]]

Wiring Diagrams; G[, [_____]]

SD-03 Product Data

****

NOTE: For Army projects, delete the bracketed items. For Navy projects, keep the bracketed items.

****

Elevator and Accessories[; G[, [_____]]]

Elevator Components[; G[, [_____]]]

Data Sheets[; G[, [_____]]]

Elevator Microprocessor Controller; G[, [_____]]

SD-05 Design Data

Emergency Power Systems

Heat Loads

Reaction Loads

SD-07 Certificates

Elevator Parts and Components price lists; G[, [_____]]

Warranty

Endorsement Letter

Welders' Qualifications

Elevator Controller Certification; G[, [_____]]

SD-10 Operation and Maintenance Data

Elevator, Data Package 4; G[, [_____]]

Maintenance Control Program (MCP); G[, [_____]]

Software and Documentation; G[, [_____]]

Submit in accordance with Sections 01 78 23 OPERATION AND MAINTENANCE DATA and 01 78 24.00 20 FACILITY ELECTRONIC OPERATION AND MAINTENANCE SUPPORT INFORMATION (eOMSI).

1.2.1 Shop Drawing Requirements

Provide assembly and arrangement of elevators, accessories, and elevator components. Show location of elevator machine in elevator machine room (MR) or in elevator machinery space (MS). Show location of elevator controller in elevator machine room or elevator control room (CR). Provide details for materials and equipment, including but not limited to operating and signal fixtures, doors, door and car frames, car enclosure, controllers, motors, guide rails and brackets, layout of hoistway in plan and elevation, and other layout information and clearance dimensions.

1.2.2 Product Data Requirements

Provide manufacturers' product data for all elevator components, including but not limited to the following: elevator controller, hydraulic pump unit, hydraulic pump and motor, hydraulic cylinder, hydraulic piping and fittings, car and hall fixture buttons and switches, cab and machine room or control room communication devices, door operator, door protection system, car roller guides, and buffers. For data sheets, provide document identification number or bulletin number, published or copyrighted prior to the date of contract bid opening. Provide controller manufacturer's published procedures for performance of each and all testing required by ASME A17.1/CSA B44.

1.2.3 Design Data

1.2.3.1 Reaction Loads

Provide calculations by registered professional engineer for reaction loads imposed on building by elevator system. Demonstrate calculations complying with ASME A17.1/CSA B44

1.2.3.2 Heat Loads

Provide calculations from elevator manufacturer, or by registered professional engineer, for total anticipated heat loads generated by all of the elevator equipment.

1.2.3.3 Emergency Power Systems

Where the facility does have an emergency power system, confirm the elevators that will be connected to the emergency power system. Confirm the complete emergency power system and sequence of operation for all elevators, including operation of the elevator lobby manual selection switch. Provide wiring diagrams for building emergency power interface with elevator controls. For elevators not supplied by an emergency power system, provide manufacturers' product data for auxiliary power systems.

1.2.4 Welders' Requirements

Comply with AWS D1.1/D1.1M, Section 5. Include certified copies of field welders' qualifications. List welders' names with corresponding code marks to identify each welder's welding work.

1.2.5 Maintenance Control Program (MCP)

For each elevator, prepare and provide a written Maintenance Control Program (MCP) that complies with ASME A17.1/CSA B44 Section 8.6, including written documentation that details the test procedures for each and every test that is required to be performed by ASME A17.1/CSA B44. Assemble all MCP documentation, and supporting technical attachments, in a single MCP package and provide in both electronic and hard copy. Assemble entire hard copy MCP in 3-ring binders. For each elevator provided, the MCP must include only documentation and instruction that apply to the elevator specified.

For each elevator, provide an additional, separate binder that includes all maintenance, repair, replacement, call back, and other records required by ASME A17.1/CSA B44. The records binder must be kept in the elevator mechanical room, maintained by elevator maintenance and service personnel, and be available at all times to authorized personnel.

Provide detailed information regarding emergency service procedures and elevator installation company personnel contact information. Provide a listing of all tools to be provided to the Contracting Officer as components of the elevator system.

1.3 QUALITY ASSURANCE

1.3.1 Qualification

Provide a designed and engineered elevator system by an elevator contractor regularly engaged in the installation of elevator systems.

Provide elevator components manufactured by companies regularly engaged in the manufacture of elevator components. Utilize only licensed and certified elevator personnel for the installation, adjusting, testing, and servicing of the elevators.

1.3.1.1 Elevator Contractor's Elevator Technicians

For elevator installations in the United States, including United States territories, perform all elevator related work under the direct guidance of a state certified elevator technician with a minimum of three years of experience in the installation of elevator systems of the type and complexity specified in the contract documents. Provide an endorsement letter from the elevator manufacturer, certifying that the elevator specialist is qualified. All elevator technicians must carry a current certification issued by one of the following organizations:

a. National Association of Elevator Contractors (NAEC)

b. National Elevator Industry Education Program (NEIEP)

1.3.2 Manufacturers' Technical Support

Provide elevator components from manufacturers that provide factory training and online and live telephone elevator technical support to any elevator installation, service, and maintenance contractor. Provide elevator components from manufacturers that guarantee accessibility to all replacement and repair parts and components to any elevator installation, service, and maintenance contractor. Use only elevator component manufacturers that provide current published price lists for all elevator parts and components.

1.3.3 Operation and Maintenance Data

Assemble all shop drawing and product data material into O&M Data Packages in accordance with Article SUBMITTALS. Provide two complete O&M Data Packages in hard copy and two complete electronic O&M data packages on separate CDs, in PDF format. Provide all O&M Data Packages to Contracting Officer. Include controller diagnostic documentation and software as required under Article CONTROL EQUIPMENT.

1.3.4 Wiring Diagrams

Provide complete wiring diagrams and sequence of operations, which show electrical connections and functions of elevator systems. Provide one set (279 mm by 432 mm11 inch by 17 inch minimum size) of wiring diagrams, with individual sheets laminated in plastic and assembled in binder, to be stored in the machine room or control room cabinet. Provide one additional hard copy set and two complete electronic sets on separate CDs, in PDF format. Provide all wiring diagram sets to the Contracting Officer. Coded diagrams are not acceptable unless fully identified.

1.3.5 Machine Room/Control Room Cabinet

For storage of O&M Data Packages and Wiring Diagrams, provide locking metal cabinet with a minimum size of 508 mm W by 305 mm D by 762 mm H 20 inch W by 12 inch D by 30 inch H. Cabinet must be sized large enough to accommodate all O&M Data and hardware required in paragraphs OPERATION AND MAINTENANCE DATA and WIRING DIAGRAMS. Secure cabinet to machine room or control room wall.

1.4 NEW INSTALLATION SERVICE

****
NOTE: Use Bi-weekly option for Hospitals and other high use facilities.
****

Provide elevator warranty service in accordance with the manufacturer's maintenance plan, warranty requirements and applicable safety codes, for a period of 12 months after the date of acceptance by Contracting Officer. Perform this work during regular working hours. Provide supplies and parts to keep elevator system in operation. Perform service only by factory trained personnel. Provide [Monthly][Bi-weekly] services to include repairs, adjustments, greasing, oiling, and cleaning. Provide service log in elevator machine room or control room and update [Monthly][Bi-weekly], throughout the one-year warranty period.

****
NOTE: One hour emergency service below is standard; only use two hour for remote locations.
****

Provide 24-hour emergency service, with [one hour][two hour] on-site response time, during this period without additional cost to the Government.

1.4.1 Periodic Elevator Certification Inspection and Testing

Provide elevator mechanic to support [NAVFAC]QEI Certified Elevator Inspector in the periodic six-month and the annual Category 1 elevator certification inspection and testing. Perform Category 1 inspection and testing no greater than 30 days prior to the end of the warranty period. Perform all elevator certification testing in the presence of QEI Certified Elevator Inspector.

In conjunction with the testing noted above, test systems for Emergency Power Operation, Earthquake Emergency Operation, and Hospital Emergency Commandeering Service Operation, as applicable. Schedule so that testing does not interfere with building operations.

1.5 FIRE PROTECTION SYSTEM

****
NOTE: Confirm that sections listed throughout this article are part of project. Add or delete sections as needed for project.
****

Coordinate interface between building fire protection system and elevator controls.

Additional fire protection requirements are located in: [Section 28 31 60 INTERIOR FIRE ALARM SYSTEM, NON-ADDRESSABLE;] [Section 28 31 66 INTERIOR FIRE ALARM AND MASS NOTIFICATION SYSTEM, NON-ADDRESSABLE;] [Section 28 31 70 INTERIOR FIRE ALARM SYSTEM, ADDRESSABLE;] [Section 28 31 76 INTERIOR FIRE ALARM AND MASS NOTIFICATION SYSTEM, ADDRESSABLE;] [Section 28 31 02.00 20 FIRE ALARM REPORTING SYSTEMS - DIGITAL COMMUNICATORS;] [Section 21 13 13 WET PIPE SPRINKLER SYSTEMS, FIRE PROTECTION;] [_____]

and Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM.

1.5.1 Fire Alarm Initiating Devices

Fire alarm initiating devices are specified in [Section 28 31 60 INTERIOR FIRE ALARM SYSTEM, NON-ADDRESSABLE] [Section 28 31 66 INTERIOR FIRE ALARM AND MASS NOTIFICATION SYSTEM, NON-ADDRESSABLE] [Section 28 31 70 INTERIOR FIRE ALARM SYSTEM, ADDRESSABLE] [Section 28 31 76 INTERIOR FIRE ALARM AND MASS NOTIFICATION SYSTEM, ADDRESSABLE] [_____], including conduit and wiring from each detector to fire protection addressable modules in elevator machine room or control room.

1.5.2 Fire Sprinklers

Provide fire sprinklers in accordance with all applicable safety codes and with [Section 21 13 13 WET PIPE SPRINKLER SYSTEMS, FIRE PROTECTION][_____]. Provide shutoff valve, check valve, and non-adjustable, zero time-delay flow switch, in each sprinkler line immediately outside of each machine room, control room, and hoistway, as applicable. Provide inspectors' test valve for periodic testing of flow switch and shunt trip disconnect.

Pipe sprinkler piping serving these spaces in a series manner with no laterals. Locate inspectors' test connection at the end of pipe runs such that operation of the test connection will purge air from system piping.

1.5.3 Shunt Trip Disconnect

Provide flow switches specified in paragraph FIRE SPRINKLERS to comply with ASME A17.1/CSA B44 and NFPA 72 for shunt trip of the main line power supply. For each elevator, provide control wiring connecting the flow switch to a shunt trip equipped circuit breaker located in the elevator machine room or control room. Upon flow of water, flow switch will instantaneously cause opening of the shunt-trip circuit breaker and remove power from the elevator. Flow switch must also send a signal to fire alarm control panel to indicate water flow condition.

PART 2 PRODUCTS

2.1 ELEVATOR DESCRIPTION

Provide elevator system that complies with ASME A17.1/CSA B44 in its entirety, ASME A17.2 in its entirety, and additional requirements specified herein. Provide elevator system that meets or exceeds the NEII-1 Ride Quality Performance Standards Matrix (RQPSM). Comply with the RQPSM "Intermediate Performance" criteria.

Provide and install elevators in accordance with 36 CFR 1191 - ABAAS, ICC IBC, IEEE C62.41, NFPA 70 and NFPA 101 requirements.

2.1.1 Elevator Design Parameters

****

NOTE: Traffic Analysis and Minimum Cab Size

Perform a traffic analysis and conduct interviews with the facility user to determine number, size, and type of elevators necessary to serve the needs of the facility user. For Army and Navy projects,

utilize NAVFAC ITG 2013-01 Elevator Design to determine Design Type. For minimum elevator speed, specify 0.64 MPs 125 fpm for 2 story and 0.75 MPs 150 fpm for 3 and 4 story elevators.

Use of a holeless type elevator will be limited to a maximum travel distance of 386 cm 12 ft-8 in.
****

a. Type: [In-Ground Direct Plunger] [Holeless]

b. Rated load: [_____] kg lb.

c. Rated Speed: [0.64][0.75] MPs [125][150] fpm

d. Car Inside Dimensions: [_____] cm ft. [_____] cm in. wide, [_____] cm ft. [_____] cm in. deep and [_____] cm ft. [_____] cm in. high

e. Hoistway Door Type & Size: [Manual] [Power operated] Vertical [Rising] [Bi-Parting] [_____] cm ft. [_____] cm in. wide and [_____] cm ft. [_____] cm in. high

f. Car Gate Type: [Manual] [Power operated] Vertical Rising

****
NOTE: Refer to ASME A17.1/CSA B44 for Classes of loading.
****

g. Loading Type: Class [A][B][C]

2.1.2 Cab Enclosure and Hoistway Entrance Assemblies

****
NOTE: If retaining 1st option in sentence below, ensure that finishes are indicated, most likely somewhere on the drawings. In either case, indicate finish colors of elevator materials in finish schedule on drawings.
****

****
NOTE: Specify stainless steel doors, side panels and wall trim in hospital cars.
****

Provide finishes [as indicated.][as listed below:

a. Floor; [mill finish steel diamond plate][painted steel diamond plate][aluminum diamond plate][tongue and groove hardwood][_____].

b. Walls; [prefinished steel panels][stainless steel][_____].

Wall trim; [prefinished steel][stainless steel][_____].

Accessories; [handrail][_____]

****
NOTE: Retain bracketed phrase for freight elevators

that do not have Front and Rear openings.
****

Accessories; Provide in-car horizontal buck-board wall protection on full length of side walls [and back wall] of elevator cab.

c. Car doors, car door returns, and wall reveals; [prefinished steel panels][stainless steel][_____].

d. Ceiling; [prefinished steel panels][stainless steel][anodized aluminum][_____].

e. Hoistway Entrance Assembly Material and Finishes; [prefinished steel][stainless steel][_____].]

2.2 ELEVATOR OPERATION

ASME A17.1/CSA B44, Introduction, Section 3, Definitions.

****
NOTE: Choose one of the following four types of elevator operation.
****

[2.2.1 Single, Two-Stop, Automatic Operation

****
NOTE: Choose for single elevator serving two landings.
****

Provide Single Two-Stop Automatic Operation.

][2.2.2 Selective Collective Automatic Operation

****
NOTE: Choose for single elevator serving three or more landings.
****

Provide Selective Collective Automatic Operation.

][2.2.3 Duplex Selective Collective Automatic Operation

****
NOTE: Choose for two adjacent elevators.
****

Provide Duplex Selective Collective Automatic Operation. If a car is taken out of service or fails to respond to a landing call within a predetermined adjustable time limit of approximately 40 to 180 seconds, transfer calls to the other car functioning as a single car Selective Collective elevator until the out-of-service car is returned to the system.

][2.2.4 Group Automatic Operation

****
NOTE: Choose for three or more elevators that serve the same elevator lobby.

****

Provide Group Automatic Operation. If a car is taken out of service, or fails to respond to a landing call within a predetermined adjustable time limit of approximately 40 to 180 seconds, transfer calls to another car until out-of-service car is returned to the system.

]2.3 SPECIAL OPERATION AND CONTROL

Provide the following special operations and control systems.

2.3.1 Keys for Elevator Key Switches

Provide a minimum of twelve keys per unique cylinder used on all key switches for a single elevator. If there is more than one elevator, additional keys will not be required unless there are additional unique lock cylinders. Provide keys with brass or fiberglass tags marked "PROPERTY OF THE U.S. GOVERNMENT" on one side with function of key or approved code number on the other side.

2.3.2 Firefighters' Emergency Operation (FEO)

****

NOTE: Coordinate FEO Designated Landing with Fire Protection Designer.

****

Provide FEO equipment and signaling devices. The designated level for the FEO Phase I key operated switch is the [ground][_____] floor. In the FEO Phase I fixture, provide FEO Operating Instructions.

2.3.2.1 Firefighters' Emergency Operation (FEO) Key Box

Provide flush mounted, locking, FEO Key Box of a minimum size of 127 mm W by 229 mm H by 38 mm D 5 inch W by 9 inch H by 1.5 inch D. Install at a height of 183 cm 6 feet above floor level and directly above the FEO Phase I key switch. Provide box equipped with lock that uses the FEO K1 key.

2.3.3 Hoistway Access Operation

Provide hoistway access operation with switches at top and bottom terminal landings. Locate switch 183 cm 6 feet above floor level, within 305 mm 12 inches of elevator hoistway entrance frame or with the ferrule exposed when located in the elevator entrance frame.

2.3.4 In-Car Inspection Operation

Provide In-Car Inspection Operation.

2.3.5 Independent Service

Provide exposed key-operated switch in car operating panel to enable independent service and simultaneously disable in-car signals and landing-call responses. Provide indicator lights that automatically illuminate during independent service. For duplex or group operation, if one car is removed from group another car will respond to its hall calls.

2.3.6 Selective Door Operation

For elevator with one or more rear openings at same level as front opening, provide full-selective operation with car and door operating buttons clearly marked for front and rear openings, front and rear car button for each such floor, and front and rear "DOOR OPEN" and "DOOR CLOSE" buttons. Only door for which the button was operated opens or closes.

[2.3.7 Elevator Emergency Power Operation

****
NOTE: Electrical design shall identify the elevators to be connected to the building emergency power system. Identify and define the complete emergency power system for all elevators. When using the 2nd bracketed option in either of the next two subparagraphs, edit as required for project-specific requirements.

For any elevator that is not included in the building emergency power operation, utilize paragraph ELEVATOR AUXILIARY POWER OPERATING SYSTEM.
****

Provide elevator emergency power operation for [all elevators] [elevator 1,2,3...]. Coordinate power supply and control wiring to accomplish initiation and operation of elevators on emergency power.

][2.3.8 Elevator Auxiliary Power Operating System

Provide elevator emergency auxiliary power operating system for [all elevators] [elevator 1,2,3...].

]2.4 ELEVATOR DRIVE SYSTEM

Provide hydraulic elevator drive system, including pump unit, piping, cylinder/plunger assembly, and associated equipment, which will operate at a maximum working pressure of 3447 kPag 500 psi or less. Provide complete elevator system that meets or exceeds the NEII-1 Ride Quality Standard, including elevator ride quality and noise levels in car and in elevator machine room and machinery space.

2.4.1 Hydraulic Pump Unit

Provide self-contained pump unit, including oil-hydraulic elevator pump, electric motor, suction-line oil strainer, and structural steel outer base with tank supports and isolation pads. Provide oil tank capacity for full plunger displacement plus at least 38 liters 10 gallons. Provide means to maintain oil temperature between 38 and 54 degrees C 100 and 130 degrees F regardless of ambient temperature. Limit acoustic output in elevator machine room and machinery space to 80 dbA.

2.4.1.1 Pump Motor

Provide intermittent-duty pump motor rated at 120 starts/hour. Provide motor that is sized so that the motor amperage does not exceed the motor data tag amperage in any operating condition, exclusive of acceleration and deceleration. Provide minimum of one mega ohm insulation resistance

between conductors and motor frame. Provide motor and pump nameplate and data tags permanently mounted on the outside of the pump unit frame, with all data viewable without the use of mirrors or other tools.

2.4.2 Hydraulic Controls and Equipment

Provide control valve, overspeed safety valve, blowout-proof muffler, and hydraulic pump discharge strainer in the hydraulic oil supply line. Provide two 1/4 turn, ball valve type manual shutoff valves. Provide one in the elevator hoistway pit and one in the elevator machine room or machinery space.

2.4.2.1 Hydraulic Control Valve

Provide constant-velocity, down-speed regulated, control valve. Down-speed regulated control valve allows the car to travel at the same speed in the down direction, regardless of the load on the elevator. In addition, the hydraulic control valve must have built-in adjustment capability to operate the elevator at 140 percent of rated speed to facilitate periodic testing of the overspeed safety valve.

2.4.2.2 Hydraulic Overspeed Safety Valve

Provide overspeed safety valve in hydraulic oil supply line, directly adjacent to the hydraulic cylinder. Provide threaded pipe connections between the hydraulic cylinder and the overspeed valve. Provide valve equipped with manufacturer's manual shutoff feature. Overspeed valve must not be equipped with a manual or automatic lowering feature. Provide adjustable valve with means to seal adjustment after inspection and testing by certified elevator inspector.

2.4.3 Hydraulic Piping and Accessories

****
NOTE: Retain bracketed sentence for in-ground direct plunger type elevators.
****

Provide ASTM A53/A53M or ASTM A106/A106M, Schedule 80, black steel piping with ASME B16.9 or ASME B16.11 fittings for supply piping. Extend schedule 80 piping from the pump control valve body, inside the pump unit, to the hydraulic cylinder in the hoistway. Provide welded or threaded forged pipe fittings for all fittings and components of the hydraulic oil supply line. [For in-ground direct plunger cylinders, provide dielectric union or isolation couplings at each end of the hydraulic oil supply line.]Provide hangers or supports for all piping and components.

2.4.3.1 Containment of Hydraulic Oil Supply Line

Protect all portions of hydraulic oil supply line that are installed below ground, including portions encapsulated in concrete or covered by construction, with continuous, Schedule 80, PVC. Inside diameter of PVC must be 76 mm 3 inches larger than the outside diameter of the hydraulic oil supply line pipe and couplings.

2.4.4 Hydraulic Elevator Type

****
NOTE: Use of a holeless type elevator with a

non-telescoping jack will be limited to a maximum travel distance of 12 ft-8 in.
****

Provide a [in-ground direct plunger] [holeless] direct plunger type hydraulic elevator. Elevator with telescopic or inverted cylinder-plungers are not acceptable and may not be used. Rope hydraulic elevator design is not acceptable and may not be used.

2.4.4.1 Cylinder-Plunger (Jack) Unit

Provide a single-stage plunger of seamless steel construction. 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. Provide a threaded, 6 mm 1/4 inch bleeder valve at the top of the cylinder, just below packing gland.

[2.4.5 Cylinder Well System

****
NOTE: Retain this paragraph and associated subparagraphs for in-ground direct plunger type elevators only.
****

For direct plunger, in-ground type hydraulic elevator, provide a dry, sealed cylinder well system.

2.4.5.1 Well Casing

Locate and drill well for the cylinder well system. Line well with steel casing, minimum 6 mm 1/4 inch wall with welded 13 mm 1/2 inch steel bottom. Set casing plumb.

2.4.5.2 PVC or HDPE Liner

Provide Schedule 80 PVC or HDPE liner with bottom cap and couplings; joints sealed watertight using pipe manufacturer's recommended adhesive or heat welding methods. Provide liner inside diameter not less than 76 mm 3 inches larger than elevator cylinder maximum outside diameter. Liner may be provided as a cylinder manufacture's applied liner or as a separate component. For separate liner, set liner plumb in well casing, located for cylinder installation. Provide dry, salt-free sand below and around liner to top of well casing.

2.4.5.3 Cylinder Installation

Remove all moisture from inside of liner. Install cylinder plumb, inside liner. Provide a 6 mm 1/4 inch copper evacuation tube inside the liner. The bottom of the evacuation tube must be within 152 mm 6 inch of the bottom of the liner. Top of evacuation tube must extend at least 152 mm 6 inch above pit floor. Provide top of test tube with removable cap to exclude foreign matter. Provide air inlet pressure fitting in top of liner and accessible in pit, for performance of air pressure test. Secure Liner/Cylinder Assembly as recommended by cylinder manufacturer.

2.4.5.4 Cylinder Liner Moisture Sensor System

Provide moisture and oil sensors inside the cylinder liner for detection

of oil and water at the bottom of the cylinder liner. Provide sensor monitoring system that will actuate audible and visual alarms and identify the presence of water and identify the presence of oil inside the liner.

2.4.5.5 Seal Top of Well Casing

Upon successful test and certification of Liner/Cylinder assembly, seal gap between steel well casing and liner with foam insert strong enough to retain and support final grouting. Provide 21 MPa 3000 psi grout to a minimum of 102 mm 4 inch thickness and level top of final grouting with pit floor.

]2.5 CONTROL EQUIPMENT

Enclose all elevator control equipment in factory-primed and baked-enamel coated sheet-metal cabinets with ventilation louvers and removable or hinged doors. Mount cabinets at a height of 254 mm 10 inches above machine room or control room finish floor.

2.5.1 Motor Control Equipment

Provide elevator motor control with electronic, soft-start motor starter.

2.5.2 Elevator Microprocessor Controller

For each individual elevator controller, and for each group controller, provide a microprocessor controller that complies with the following paragraphs. Provide controller(s) package that includes all hardware and software required for the installation, maintenance, and service of the elevator, in its' entirety. Provide verification of technical support service that the controller manufacturer provides to any licensed elevator installation, service, and maintenance company.

Provide an elevator controller from a manufacturer that provides comprehensive factory training to include controller installation, adjustment, service, and maintenance. The training must be identified as available to any licensed elevator contractor. Provide verification of an established and documented training schedule, with pricing, for factory training classes that manufacturer has provided for a minimum period of one year prior to contract award date.

The elevator controller must be identified as available for purchase and installation by any licensed elevator contractor. All components, parts, diagnostic tools, and software must be available for purchase and installation and use by any licensed elevator contractor; "exchange-only" provisions for the purchase of spare parts are not acceptable. The elevator controller manufacturer must publish an industry competitive price listing for all controller parts, diagnostic tools, and software.

Provide verification of telephone and internet based technical support service that the elevator controller manufacturer provides to any licensed elevator installation, service, and maintenance company at an industry competitive price. The service must include live telephone based technical support for installation, adjustment, maintenance, and troubleshooting of the elevator controller and related elevator components. The service must be available during standard working hours.

Provide an elevator controller that is designed to automatically reestablish normal elevator operation following any temporary loss of

power, regardless of duration.

2.5.2.1 Elevator Controller Interface Cabinet

For each individual elevator microprocessor controller, provide a separate elevator control cabinet with an integrated human interface system. For group elevator installations, a single cabinet and interface system with full access to each elevator controller may be utilized. The separate controller interface cabinet must be supplied by the elevator controller manufacturer and include a minimum 305 mm 12 inch wide keyboard and a minimum 254 mm 10 inch monitor. The elevator controller interface cabinet must comply with arc-flash protection requirements of NFPA 70E and UFC 3-560-01.

2.5.2.1.1 Elevator Microprocessor Human Interface

The interface system must provide complete elevator controller interface capability and must include the elevator controller manufacturer's comprehensive package of installation and diagnostic software. The microprocessor interface system must provide unrestricted access to all parameters, all levels of adjustment, and all flags necessary for installation, adjustment, maintenance, and troubleshooting of each elevator and for the elevator group. All software programming must be stored in non-volatile memory. The elevator controller fault log must provide non-volatile memory fault log storage of all faults, trouble calls, and fault history for a minimum of one year and the ability to download or print the fault log. The controller interface must also provide the capability to display and diagnose trouble calls, faults, and shutdowns. Expiring software, degrading operation, and "key" access controls are not acceptable.

2.5.2.2 Software and Documentation

Provide three copies of the manufacturer's maintenance and service diagnostic software, with complete software documentation, that will enable the same level of unrestricted access to all controllers of the same make and model, regardless of the installation date or location. Provide signed certification, from the manufacturer's corporate headquarters, that guarantees that the microprocessor software and access system will not terminate the unlimited and unrestricted access at any future date.

2.5.2.3 Elevator Controller Certification

For elevator installations in the United States, including United States territories, provide an elevator microprocessor controller that has a current certificate of safety code compliance issued by the Technical Standards and Safety Authority (TSSA), Toronto, Canada.

2.6 OPERATING PANELS, SIGNAL FIXTURES, AND COMMUNICATIONS CABINETS

For all panels and fixtures, provide identical and uniform panel and fixture design, material, finish, and components for all elevators. For all panels and fixtures, legibly and indelibly identify all buttons, devices, and all operating positions for each device. Use engraving and backfilling, or photo etching, for button and device designations. Do not use attached signs. Provide elevator manufacturers' standard grade for all key switches unless otherwise specified. All illuminating panels and fixture components must utilize LED lighting for energy efficiency.

2.6.1 Car and Hall Buttons

For all cab and landing fixture buttons, provide industry-standard, vandal resistant push buttons with positive-stop assembly design. Buttons must be minimum 19 mm 3/4 inch diameter, satin-finish stainless steel, with illuminating LED halo.

2.6.1.1 Hall Station Door-Operating Buttons

****
NOTE: Use the following for freight elevators with power-operated bi-parting doors.
****

Provide hall station door-operating buttons, identical in size and design to hall call buttons, but not illuminating.

2.6.2 Freight Car-Operating Panel

****
NOTE: Use two Car Operating Panels for front and rear opening elevators.
****

Provide each car with [one] [two] car operating panel[s] that contains operation controls and communication devices. Provide exposed, flush mounted buttons for the controls identified in subparagraph OPERATOR CONTROLS. Provide a lockable service cabinet for the controls listed in subparagraph SERVICE CONTROLS. Use engraving and backfilling or photo etching for button and switch designations. Do not use attached signs.

2.6.2.1 Operator Controls

In addition to ASME A17.1/CSA B44 requirements, provide the following operating controls, identified as indicated:

a. Illuminating car-call buttons identified to correspond to landings served by the elevator.

b. "DOOR OPEN" and "DOOR CLOSE" buttons. For front and rear openings at the same floor, include the identification "F" and "R" for each opening.

c. Red, illuminating "ALARM" button.

d. Key-operated "Independent Service" switch.

e. "Help" communication device to include communication between elevator cab and elevator machine room or control room.

2.6.2.2 Service Controls

In addition to ASME A17.1/CSA B44 requirements, provide the following operating controls, identified as indicated:

a. Provide a key-operated, three-position switch for "In car Inspection Operation" and "Hoistway Access". The center switch position will provide normal, automatic operation.

b. "Car Light" switch.

c. "Car Fan" switch with two speed settings identified.

d. 120-volt ac 60 Hz single-phase duplex electrical outlet of ground-fault-circuit-interrupt (GFCI) design.

2.6.2.3 Certificate Window

Provide a minimum 102 mm wide by 152 mm high 4 inch wide by 6 inch high certificate window for elevator inspection certificate. Locate window in the Service Controls door of the Car Operating Panel.

2.6.2.4 Emergency Signaling Devices

Provide an audible signaling device, operable from the Car Operating Panel button marked "ALARM". The audible signaling device must have a sound pressure rating between 80 and 90 dBA at 3 meters 10 ft. Provide battery backup power capable of operating the audible signaling device for at least 1 hour.

2.6.3 Elevator In-Car Position Indicators

For all elevators, provide illuminating position indicator in the Car Operating Panel.

2.6.4 Elevator In-Car Direction Indicators

For 2-stop elevator installations, provide visual direction indicators and audible car arrival signal in the elevator car door jamb, in accordance with ABA Standards. Visual indicators must be visible from the hall call fixture.

2.6.5 Hall Call Landing Fixtures

Provide a hall call fixture adjacent to each elevator. Provide a single push-button for terminal landings and dual push-buttons, up and down, at intermediate landings.

2.6.5.1 Designated Landing Hall Call Fixture

2.6.5.1.1 Location of COMMUNICATION MEANS FAILURE (CMF) Visual Signal

When required by ASME A17.1/CSA B44, provide an elevator CMF audible and illuminating signal, and reset switch, in the FEO Designated Landing hall call fixture. Mount the signal and reset switch at a minimum of 178 mm 7 inches above the "UP" hall call button.

2.6.5.1.2 COMMUNICATION MEANS FAILURE (CMF) Visual and Audible Signal Operation

Provide a CMF visual and audible signal system that conforms to ASME A17.1/CSA B44. Provide continuous verification of operability of the telephone line and immediate activation of audible and visual signals when verification means determines that the telephone line is not functioning. Provide illumination of visual signal at one second intervals. Provide a minimum of 65 dBA audible signal at 30 second intervals.

2.6.5.1.3 Firefighters' Emergency Operation Phase I Switch and Visual Signal

When required by ASME A17.1/CSA B44, provide an elevator Firefighters' Emergency Operation Phase I switch and illuminating visual signal in the FEO Designated Landing hall call fixture. Provide FEO Phase I visual signal that is designed with intermittent, flashing, illumination when actuated by the machine room, control room or hoistway fire alarm initiating device. Locate FEO Phase I key switch above the CMF visual signal with a minimum of 152 mm 6 inches vertical between the centerlines of the CMF signal and the FEO Phase I key switch. Locate FEO Phase I visual signal directly above the Phase I switch. In addition, locate Elevator Corridor Call Station Pictograph at top of hall call fixture.

2.6.6 Elevator Car Position and Direction Indicators and Car Arrival Signal

For elevator installations with three or more stops, provide a separate hall landing fixture that includes the visual elevator position indicator, visual direction indicators, and audible car arrival signal, in accordance with ABA Standards.

2.6.7 Designated Landing Elevator Identification Fixture

For duplex and group elevator installations, provide a separate elevator identification fixture for each elevator, with identification engraved and backfilled with a contrasting color. Number elevators from left to right, as seen during primary approach from building main entrance to elevator lobby. For multiple elevator groups, begin numbering with group that is closest to the building main entrance.

2.6.8 Emergency or Standby Power

When emergency or standby power is provided for elevator operation, provide an elevator emergency power visual indicator that conforms to ASME A17.1/CSA B44. Locate the visual signal in the Firefighters Emergency Operation fixture for each simplex elevator and for each elevator group. When an emergency power selector switch is required, provide switch in a separate, flush mounted fixture located at the designated level, in view of all elevator entrances.

2.7 CAR DOOR EQUIPMENT

2.7.1 Car Door Operator

Provide elevator door operator equipment and circuitry that is designed and installed as discreet communication. Serial communication must not be used for this system.

2.7.2 Infra-red Curtain Unit

Provide Infra-red Curtain Unit (ICU) with multiple infra-red beams that protect to the full height and width of the door opening. Provide door nudging operation.

2.8 FREIGHT ELEVATOR GUIDES, PLATFORM, AND ENCLOSURE

2.8.1 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. For freight elevators with a rated load greater than 10,000 lbs., slide guides may be used in lieu of roller guides.

2.8.2 Car Shell Return Panels, Doors, Entrance Columns, and Transom

Provide 16 Gauge minimum [prefinished steel][stainless steel] cab wall panels and entrance components. Use same material and finish for all hoistway and car entrance assemblies. Apply sound-deadening material on exterior of all cab wall panels.

2.8.3 Car Enclosure Top

Provide reinforced, 12 gauge minimum steel car enclosure top. Provide hinged emergency exit with lock that complies with the seismic risk zone 2 or greater design requirements of ASME A17.1/CSA B44. Locate emergency exit hinge towards the rear of the elevator cab. Design and configure the elevator cab interior ceiling to provide convenient and unobstructed access to, and use of, emergency exit from inside the elevator cab.

2.8.4 Car Door

Provide [two section]vertical rising gate with power door operator.

2.8.5 Car Entrance Sill

Provide one piece steel car entrance sill(s). Set sills level and flush with cab finish floor.

2.8.6 In-Car Horizontal Buck-Board Wall Protection

****

NOTE: Retain bracketed phrase for freight elevators that do not have Front and Rear openings.

****

Provide minimum 64 mm thick by 305 mm high 2 1/2 inch thick by 12 inch high #2 Oak protection boards on all side walls [and back wall] of the elevator cab. Position boards at a height to prevent damage from fork lift traffic.

2.8.7 Cab Finish Floor

Provide cab finish floor with top of finish floor flush with the cab sill.

2.8.8 Car Fan

Provide 2-speed fan for car enclosure forced ventilation. Fan must be mounted in the car enclosure top.

2.8.9 Car Lighting

Utilize LED lighting for elevator car interior illumination. Provide a minimum of 10 foot-candles, measured at all areas of the car enclosure

floor. Provide automatic car lighting operation that will turn off car lights after 3 minutes of inactivity. Car lights must automatically turn on upon actuation of an elevator car or hall call.

2.9 FREIGHT ELEVATOR HOISTWAY DOORS AND ENTRANCES

Provide hoistway entrance assemblies with a minimum 1-1/2 hour fire rating. Use same material and finish for all hoistway and car entrance assemblies.

2.9.1 Hoistway Entrance Frames

Provide 14 gage minimum [prefinished carbon sheet steel][stainless steel] hoistway entrance frames. Provide door panels with truckable sill. Provide minimum 102 mm by 229 mm 4 inch by 9 inch height vision panel in upper door panel.

2.9.2 Hoistway Entrance Sills

Provide one-piece 8 mm thick, 152 mm by 152 mm 5/16 inch thick, 6 inch by 6 inch steel angle iron sill with top of sill flush with hoistway landing finish floor. Steel angle-iron sill must be set into and fully supported by the concrete floor or the steel building structure. Use same material for all hoistway and car entrance sills.

2.10 HOISTWAY EQUIPMENT

2.10.1 Car Guide Rails and Fastenings

Provide T-section type guide rails for car. Paint rail shanks with one coat of black enamel.

2.10.2 Pit Equipment

****
NOTE: Delete bracketed phrase for holeless applications.
****

Provide rail-to-rail pit channels to serve as mounting surface for main guide rails [, hydraulic cylinder]and car buffers. Method of installation of channels, brackets and buffer mounts must be such that pit waterproofing is not punctured.

2.10.3 Pit "STOP" Switch

Provide push-to-stop/pull-to-run type pit "STOP" switch.

2.10.4 Traveling Cables

Suspend traveling cables by means of self-tightening webbed devices or internal suspension members.

2.10.5 Hoistway Pit Ladder

Provide continuous horizontal rungs for the full height of the pit ladder.

PART 3 EXECUTION

3.1 INSTALLATION

Install in accordance with DOD design criteria, contract specifications, manufacturer's instructions, NEII-1 Building Transportation Standards and Guidelines, and all applicable building and safety code requirements.

3.1.1 Structural Members and Finish Materials

Do not cut or alter structural members. Do not alter finish materials from manufacturer's original design. Restore any damaged or defaced work to original condition.

3.1.2 Miscellaneous Requirements

Provide recesses, cutouts, slots, holes, patching, grouting, and refinishing to accommodate elevator installation. Use core drilling to drill all new holes in concrete. 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 spot paint.

3.2 FIELD QUALITY CONTROL

The Contractor will provide and utilize a third-party licensed and certified Qualified Elevator Inspector (QEI) to conduct elevator pre-acceptance inspection and testing. The QEI must perform inspections and witness tests to ensure that the installation conforms to all applicable safety codes and contract requirements. The QEI will be directly employed by the Contractor and independent of the elevator contractor.

Upon completion, the QEI must provide written test data for all ASME A17.1/CSA B44 Acceptance Tests and written certification that the elevator is complete and ready for final Acceptance Inspection, Testing, and Commissioning.

3.3 ACCEPTANCE INSPECTION, TESTING AND COMMISSIONING

When elevator system installation is complete and ready for final inspection, notify Contracting Officer that elevator system is ready for Acceptance Inspection, Testing, and Commissioning. Provide QEI certification specified in Article FIELD QUALITY CONTROL.

****

NOTE: Use the first bracketed paragraph for all Navy Facilities and for all projects managed by NAVFAC FEAD. Use the second bracketed paragraph for Air Force, Army, and NASA projects that are not managed by NAVFAC FEAD.

****

[Contracting Officer will obtain services of Naval Facilities Engineering Command (NAVFAC) QEI Certified Elevator Inspector. NAVFAC QEI will utilize the applicable NAVFAC Elevator Acceptance Inspection Form to record the results of inspection and testing and to identify safety code and contract deficiencies. Specific values must be provided for all tests required by ASME A17.1/CSA B44, ASME A17.2, and contract documents. Upon completion of inspection and testing, the NAVFAC QEI will sign a copy of

the completed forms and provide the signed copy to the Contracting Officer or representative. Within two weeks of the inspection, the QEI will also prepare a formal inspection report, including all test results and deficiencies. Upon successful completion of inspection and testing, NAVFAC Certified Elevator Inspector will complete, sign and post form NAVFACENGCOM 9-11014/23(Rev.9-2009), Elevator Inspection Certificate.

][Contracting Officer will obtain the services of a third-party QEI Certified Elevator Inspector. The QEI must utilize an Elevator Acceptance Inspection Form to record the results of inspection and all testing and to identify safety code and contract deficiencies. Specific values must be provided for all tests required by ASME A17.1/CSA B44, ASME A17.2, and contract documents. Upon completion of inspection and testing, the QEI must sign a copy of the completed forms and provide to the Contracting Officer. Within two weeks of the inspection, the QEI must also prepare a formal inspection report, including all test results and deficiencies. Upon successful completion of inspection and testing, the QEI will complete, sign, and provide a certificate of compliance with ASME A17.1/CSA B44.

]3.3.1 Acceptance Inspection Support

Prime and Elevator Contractors must provide inspection support and perform all required tests, in order to demonstrate proper operation of each elevator system and to prove that each system complies with contract requirements and all applicable building and safety codes. Inspection procedures in ASME A17.2 form a part of this inspection and acceptance testing. All inspection and testing must be conducted in the presence of the Qualified Elevator Inspector (QEI).

If the elevator does not comply with all contract and safety code requirements on the initial Acceptance Inspection and Test, the Contractor is responsible for all costs involved with re-inspection and re-testing required as a result of contractor delays and discrepancies discovered during inspection and testing.

3.3.2 Testing Materials and Instruments

Furnish all testing materials and instruments necessary for Acceptance Inspection, Testing and Commissioning. At a minimum, include calibrated test weights, tachometer, accelerometer, hydraulic pressure gauge, 600-volt mega ohm meter, volt meter and ammeter, infrared temperature gauge, door pressure gage, dynamometer, and 6 meter 20 foot tape measure.

3.3.3 Field Tests

3.3.3.1 Endurance Tests

Test each elevator for a period of one hour continuous, automatic operation, with specified rated load in the elevator cab. During the one hour test, stop car at each floor, in both directions of travel, and allow automatic door open and close operation. The requirements for Automatic Operation, Rated Speed, Leveling, Temperature Rise and Motor Amperes must be met throughout the duration of the Endurance Test. Restart the one hour test period from the beginning, following any shutdown or failure.

3.3.3.2 Speed Tests

Determine actual speed of each elevator, in both directions of travel,

with rated load and with no load in elevator car. Make Speed tests at the beginning and at the end of the Endurance test. Determine speed by tachometer reading or accelerometer, excluding accelerating and slow-down zones. Under all conditions, minimum acceptable elevator speed is the Rated speed specified. Maximum acceptable elevator speed is 110 percent of Rated speed.

3.3.3.3 Leveling Tests

Test elevator car leveling operation and provide a leveling accuracy equal to or less than 3 mm 1/8 inch at each floor with no load in car, and with rated load in car, in both directions of travel. Determine leveling accuracy at the beginning and at the end of the endurance tests.

3.3.3.4 Temperature Rise Tests

Determine temperature rise of elevator pump motor and hydraulic fluid during one-hour full-load test run. Under these conditions, maximum temperature rise must not exceed acceptable temperature rise indicated on manufacturer's data plate. Start test only when equipment is within 5 degrees C of ambient temperature.

3.3.3.5 Motor Ampere Tests

At beginning and end of Endurance test, measure and record motor amperage in both directions of travel and in both no-load and rated load conditions.

3.3.3.6 Elevator Performance and Ride Quality Testing

Evaluate elevator performance to ensure compliance with specification requirements related to the NEII-1 Performance Standards Matrix for New Elevator Installations.

3.3.3.7 Hydraulic Safety Valve (Automatic Shutoff Valve) Tests

In order to ensure consistent performance, regardless of hydraulic oil temperature, test the Hydraulic Safety Valve twice. Test once before the one-hour endurance test and once immediately after the one-hour test. For elevator certification, safety valve must perform to code in both tests.

3.3.3.8 Hydraulic Pressure Tests

Check the hydraulic static pressure and rated-speed operating pressure at the hydraulic control valve, under both no load and rated load conditions.

3.3.3.9 Pressure Test of Liner/Cylinder Assembly

Perform 138 kPag 20 psig pressure test of the completed and installed liner/cylinder assembly. Test liner/cylinder assembly as a sealed unit. Provide safety relief valve set to relieve at 138 kPag; 114 mm 20 psig; 4.5 inch diameter dial pressure gage scaled for 0 to 175 kPag 0 to 50 psig and calibrated to 0.5 percent accuracy; and an air pressure admission

throttle and shutoff valve. 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. Perform test in the presence of, and witnessed by, a Certified Elevator Inspector.

-- End of Section --