
USACE / NAVFAC / AFCEA UFGS-14210 (April 2005)

Preparing Activity: USACE Superseding
UFGS-14210A (November 2004)
UFGS-14210N (March 2001)
UFGS-14211A (November 2003)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated 23 June 2005

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DIVISION 14 - CONVEYING SYSTEMS

SECTION 14210

ELEVATORS, ELECTRIC

04/05

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SECTION 14210

ELEVATORS, ELECTRIC 04/05

NOTE: This guide specification covers the requirements for electric passenger and freight elevators.

Comments and suggestions on this guide specification are welcome and should be directed to the technical proponent of the specification. A listing of technical proponents, including their organization designation and telephone number, is on the Internet.

Recommended changes to a UFGS should be submitted as a Criteria Change Request (CCR).

Use of electronic communication is encouraged.

Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.

PART 1 GENERAL

NOTE: All facility designs which include elevators shall comply with UFC 3-490-06 "DESIGN: ELEVATORS". For NAVFAC projects, any editing of non-bracketed paragraphs in this specification must be approved through the NAVFAC Elevator Program.

The Designer will incorporate the following features into the design and will show in the drawings as applicable.

1. Complete design of the hoistways, pits, machine rooms including all structural requirements, sizing, access, fire-resistant rating, ventilation, waterproofing and drainage.

2. Proper size of openings into hoistway walls for installing hoistway door assemblies.
3. Storage facilities for elevator equipment during construction.
4. Electrical service requirements for elevators, including sizings in compliance with codes and locations for fused and unfused disconnect switches.
5. Sill supports, including steel angles, sill recesses, and grouting of door sills.
6. Structural steel door frames with extensions to beams.
7. Locations for hall stations and hall lanterns.
8. Emergency power supply with automatic time-delay transfer switch and auxiliary contacts with wiring to elevator controller.
9. Telephone and or Intercom connections to elevator hoistway.
10. Location of smoke detectors required for Firefighters' Service. The designer will also indicate wiring of the smoke detectors to the elevator control system and to the building fire alarm system.
11. Wiring to elevator alarm bells and fire-fighters' service.
12. Lighting, ventilation and heat to machine room.
Ambient temperature of 10 degrees C (50 degrees F) min., 32 degrees C (90 degrees F) max.

1.1 REFERENCES

NOTE: Issue (date) of references included in project specifications need not be more current than provided by the latest guide specification. Use of SpecsIntact automated reference checking is recommended for projects based on older guide specifications.

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 WELDING SOCIETY (AWS)

AWS D1.1/D1.1M

(2004) Structural Welding Code - Steel

ASME INTERNATIONAL (ASME)

ASME A17.1 (2004) Handbook on Safety Code for Elevators and Escalators

ASME A17.2.1 (1994) Checklist for Inspection and Test of Electric Elevators

ASME A17.2.2 (1999) Checklist for Inspection of Hydraulic Elevators

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC (2003) International Building Code

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA MG 1 (2003; R 2004) Motors and Generators

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2005) National Electrical Code

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

29 CFR 1910.27 Fixed Ladders

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

1.2 SUBMITTALS

NOTE: Submittals must be limited to those necessary for adequate quality control. The importance of an item in the project should be one of the primary factors in determining if a submittal for the item should be required.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation 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 projects.

Submittal items not designated with a "G" are considered as being for information only for Army projects and for Contractor Quality Control approval for Navy projects.

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for [Contractor Quality Control approval.] [information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Detail Drawings[; G][; G, [____]]

Detail drawings including dimensioned layouts in plan and elevation showing the arrangement of elevator equipment, accessories, supporting systems, anchorage of equipment, 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 shall show any revised building electrical system required to make supplied elevator system function as specified. Drawings shall contain complete wiring diagrams showing electrical connections and other details required to demonstrate sequence of operations and functions of system devices. Drawings shall 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.

SD-03 Product Data

Passenger Elevators[; G][; G, [____]]
Freight Elevators[; G][; G, [____]]

Information on motor, hall station, and buffer on elevators and accessories. For elevator supporting systems, include information on car control [and emergency power] systems. Include information for maintenance and diagnostic tools for all components. On data sheets, provide document identification number or bulletin number, published or copyrighted prior to the date of contract bid opening.

Field Quality Control[; G][; G, [____]]

A plan detailing the testing procedures shall be submitted [60] [____] days prior to performing the elevator tests.

Logic Control[; G][; G, [____]]

Microprocessor control system, including appropriate hardware and software and other specified requirements.

SD-05 Design Data

Reaction loads[; G][; G, [_____]]

Calculations of reaction loads, that comply with ASME A17.1, imposed on building by elevator system. Calculations shall be certified by a Registered Professional Engineer. Do not fabricate materials nor perform construction until approved by Contracting Officer.

Heat loads[; G][; G, [_____]]

Calculations of total anticipated heat loads generated by all the elevator machine room equipment. Calculations shall be certified by a Registered Professional Engineer. Do not fabricate materials nor perform construction until approved by the Contracting Officer.

SD-06 Test Reports

Field Tests[; G][; G, [_____]]

Test reports in booklet form, showing all field tests performed to adjust each component and all field tests performed to prove compliance with the specified performance criteria, upon completion and testing of installed system. Test reports shall be submitted [14] [_____] days after the successful completion of testing.

SD-07 Certificates

Quality Assurance[; G][; G, [_____]]

[A letter no later than [14] [_____] days after the Notice to Proceed, providing the name and Statement of Qualifications, including ASME A17.1 Certificate and all required state and local licenses of the individual who will perform the duties specified herein for the Elevator Inspector.] [Copies of Elevator Inspectors State of Hawaii Licenses.] A letter of endorsement from the elevator manufacturer certifying that the Elevator Specialist is acceptable to manufacturer no later than [14] [_____] days after the Notice to Proceed, providing the name and Statement of Qualifications of the individual who will perform the duties specified herein for the Elevator Specialist. Copies of certified welders' qualifications, demonstrating compliance with AWS D1.1/D1.1M, Section 5; list of welders' names with corresponding code marks.

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals[; G][; G, [_____]]

Maintenance and Diagnostic Tools[; G][; G, [_____]]

Maintenance and Repair Action Plan[; G][; G, [_____]]

Operation and Maintenance Training[; G][; G, [_____]]

[Submit data package in accordance with Section 01781 OPERATION AND MAINTENANCE DATA.] [Three] [_____] Operation and Maintenance

Manuals, submitted [28] [_____] days prior to the Operation and Maintenance Training. Include a list of phone numbers, personnel contacts, and all tools required for operation and maintenance.

Proposed Onsite Training schedule, submitted concurrently with the Operation and Maintenance Manuals.

1.3 ELEVATOR SYSTEM

Provide pre-engineered elevator system, by manufacturer regularly engaged in the manufacture of elevator systems, that complies with ASME A17.1 in its entirety, ASME A17.2.2 in its entirety, and additional requirements specified herein. The Contractor shall submit: 1) Detail Drawings as required in the Submittals paragraph; 2) Calculations for the Reaction Loads imposed on the building by the elevator system and 3) Heat Loads generated by the elevator system.

1.4 QUALITY ASSURANCE

1.4.1 Elevator Specialist

Work specified in this section shall be performed under the direct guidance of the Elevator Specialist. The Elevator Specialist shall be regularly engaged in the installation and maintenance of the type and complexity of elevator system specified in the contract documents, and shall have served in a similar capacity for at least three systems that have performed in the manner intended for a period of not less than 24 months. Elevator system manufacturer shall provide letter of endorsement certifying that the Elevator Specialist is acceptable to manufacturer. The Elevator Specialist shall oversee the acceptance inspections and tests, and shall sign and certify the successful results. The Elevator Specialist, after completion of the acceptance inspections and tests, shall certify in writing that the installation is accordance with the contract requirements. Any discrepancy shall be brought to the attention of the Contracting Officer in writing, no later than three working days after the discrepancy is discovered.

1.4.2 Elevator Inspector

NOTE: Use the first bracketed paragraph where the Elevator Inspector will be furnished by the Contractor. Use the second bracketed paragraph for all Navy projects where a NAVFAC Certified Elevator Inspector is available (except in Hawaii) or for Army or Air Force projects where the services of a Government furnished Elevator Inspector is available and preferable to the designer and customer. The services of a NAVFAC Certified Inspector may be available for an Army and Air Force project.

Use the reference to licensing by the state of Hawaii only in the State of Hawaii. Note that the source of the Elevator Inspector will impact the funding required, therefore the options should be thoroughly considered and decided upon as early in the design process as possible, preferably at the Predesign Conference.

Where the Elevator Inspector is Government

furnished, delete the submittal requirements for the Elevator Inspector's Qualifications that is part of SD-07 above.

[The Elevator Inspector shall be [certified in accordance with the requirements of ASME A17.1] [and licensed by the State of Hawaii in elevator repair]. The Certified Elevator Inspector shall inspect the installation of the elevator(s) to assure that the installation conforms with all contract requirements. The Elevator Inspector shall be directly employed by the Prime Contractor and be independent of the Elevator System Manufacturer and the Elevator Specialist and shall witness the acceptance inspections and tests, shall approve all results and shall sign and certify the successful results. The Elevator Inspector, after completion of the acceptance inspections and tests, shall certify in writing that the installation is in accordance with the contract requirements. Any discrepancy, including any safety related deficiencies, shall be brought to the attention of the Contracting Officer in writing, no later than three working days after the discrepancy is discovered.]

[The Elevator Inspector shall be furnished by the Government and shall inspect the installation of the elevator(s) to assure that the installation conforms with all contract requirements. A NAVFAC Certified Elevator Inspector shall be utilized as required on NAVFAC projects. The Elevator Inspector shall witness the acceptance inspections and tests, shall approve all results and shall sign and certify the successful results. The Elevator Inspector, after completion of the acceptance inspections and tests, shall certify in writing that the installation is in accordance with the contract requirements. Any discrepancy, including any safety related deficiencies, shall be brought to the attention of the Contracting Officer in writing, no later than three working days after the discrepancy is discovered.]

1.4.3 Welders' Qualifications

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

1.5 NEW INSTALLATION SERVICE

**NOTE: If elevator is located in remote location,
confirm the necessity for the 1 hour response time
required below with activity.**

Provide routine warranty service in accordance with manufacturer's warranty requirements, for a period of [12] [_____] months after date of acceptance by Contracting Officer. [Perform work during regular working hours]. During the warranty service period, include 24-hour emergency service, with 1 hour response time, without additional cost to Government. Include adjustments, greasing, oiling, and cleaning. Provide routine inspection and tests of elevators in accordance with ASME A17.1 Section 8.11.3 and ASME A17.2.2. Provide supplies and parts to keep elevator system in operation. Perform service only by factory trained personnel. The Contractor shall maintain a maintenance log of all service orders performed during the warranty period and shall submit it to the Contracting Officer 21 days prior to the end of the warranty period.

1.5.1 Special Operations

Every six months, test systems for [Emergency Power Operation,] [Earthquake Emergency Operations,] [Hospital Emergency Commandeering Service Operations] [and] Firefighters' Service. Schedule to not interfere with building operations. For Firefighters' Service, test monthly in accordance with ASME A17.1, Section 8.6.10.1. Provide written results of each test operation to the Contracting Officer.

1.5.2 Documentation

Document all inspection and testing. Maintain copy of documentation in machine room.

1.5.3 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 per group of elevators. Include solid state or microprocessor diagnostic tools unavailable on the open market. Provide necessary diagnostic software in cases where the solid state or microprocessor diagnostic tools are available on the open market.

1.5.4 Keys for Elevator Key Switches

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

1.6 FIRE PROTECTION SYSTEM

[Section 13852N INTERIOR FIRE DETECTION AND ALARM SYSTEM;] Additional fire protection requirements are found in Section [13854N FIRE ALARM REPORTING SYSTEMS - DIGITAL COMMUNICATORS;] [13930A WET PIPE SPRINKLER SYSTEM, FIRE PROTECTION] [13930N WET-PIPE FIRE SUPPRESSION SPRINKLERS]; and Section [16402 INTERIOR DISTRIBUTION SYSTEM].

1.7 MAINTENANCE AND REPAIR ACTION PLAN

Provide plan of action prepared by the Elevator Specialist to provide emergency and routine maintenance in accordance with paragraph entitled NEW INSTALLATION SERVICE. Provide a list of phone numbers, personnel contacts, and all maintenance and diagnostic tools provided by paragraph "Maintenance and Diagnostic Tools", to the Contracting Officer.

PART 2 PRODUCTS

2.1 PASSENGER ELEVATORS

2.1.1 Basic Requirements

NOTE: Provide all elevators of size to accommodate handicapped access as a minimum. For all buildings of four stories or more in height, provide at least

one elevator of size to accommodate emergency medical services.

For car door opening of passenger and service elevators, 1065 mm (3 ft. 6 in.) is standard, except with 1800 kg (4000 lb.) passenger cars, use 1200 mm (4 ft. 0 in.). For special purposes, 1525 mm (5 ft. 0 in.) opening may be used.

Use two speed center opening option restrictively for elevators where larger door opening is needed and hoistway space is not available for single-speed. Otherwise, use single-speed side slide, single-speed center opening, or two-speed side slide.

Only specify gearless traction elevators for buildings more than 10 stories tall and speeds of 2.50 mps (500 fpm) or more.

- a. Type: [Geared] [Gearless]
- b. Rated Load: [_____] kg lbs.
- c. Rated Speed: [_____] mps fpm.
- d. Travel Length: [_____] m ft..
- e. Number of Stops: [_____]
- f. Number of Hoist Way Openings: [_____] Front; [_____] Rear
- g. Car Inside Dimensions: [_____] mm ft.-in. wide, [_____] mm ft.-in. deep and [_____] mm ft.-in. high.
- h. Car Door Opening: [_____] mm ft.-in. wide and [_____] mm ft.-in. high.
- i. Car Door Types: [Single-speed side slide] [Single-speed center opening] [Two-speed side slide] [Two-speed center opening] Horizontal sliding.

2.1.2 Cab Enclosures and Door Finishes

NOTE: Indicate finish colors of elevator materials in finish schedule on drawings.

Use stainless steel door facing and side panels and wall trim in hospital cars; and for moist environments such as humid or moist areas of hydroelectric plants, locks, and dams.

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

- a. Floor; [carpet] [vinyl composition tile] [vinyl sheet tile] [_____].

- b. Walls; [prefinished steel panels] [laminated plastic on particleboard] [laminated plastic on particleboard with rounded stainless steel angle edges] [stainless steel] [____]. Provide each cab wall with equally spaced and equally sized wall panels. All fasteners shall be concealed. Wall trim; [prefinished steel] [stainless steel] [____]. Accessories; [hand rails] [____].
- c. Interior face of door(s); [prefinished steel panels] [stainless steel] [____].
- d. Ceilings; [supported] [prefinished steel panels] [anodized aluminum] [eggcrate] [____]. Ceiling frame; [prefinished steel] [stainless steel] [anodized aluminum] [____].
- [e. Hoistway Doors and Frame Finishes. Provide finishes on exterior of hoistway as follows:
 - (1) Frame; [prefinished steel] [stainless steel] [____].
 - (2) Exterior face of door; [prefinished steel] [stainless steel] [____].]]

2.2 FREIGHT ELEVATORS

2.2.1 Basic Requirements

NOTE: For details of loading classes, refer to ASME A17.1, Sections 2.16.2.2 and 3.23.

- a. Type: [Geared] [Gearless]
- b. Rated Load: [____] kg lbs.
- c. Rated Speed: [____] mps fpm.
- d. Travel Length: [____] m ft..
- e. Number of Stops: [____]
- f. Number of Hoist Way Openings: [____] Front; Rear [____]
- g. Car Inside Dimensions: [____] mm ft.-in. wide, [____] mm ft.-in. deep and [____] mm ft.-in. high.
- h. Hoistway Door Type & Size: [Manual] [Power Operated] Vertical [Bi-Parting] [Rising] [____] mm ft.-in. wide and [____] mm ft.-in. high.
- i. Car Gate Type: [Manual] [Power Operated] Vertical rising
- j. Loading Type: Class [A] [B] [C]

2.2.2 Cab Enclosures and Door Frame Finishes

NOTE: Indicate finish colors of elevator materials in finish schedule on drawings.

Use stainless steel door facing and side panels and wall trim in hospital cars; and for moist environments such as humid or moist areas such as hydroelectric plants, locks, and dams.

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; [handrails] [____].
- c. Interior face of doors; [prefinished steel] [stainless steel] [____].
- d. Ceiling; [prefinished steel panels] [stainless steel] [anodized aluminum] [____].
- [e. Hoistway Doors and Frame Finishes.
Provide finishes on exterior of hoistway as follows:
(1) Frame; [prefinished steel] [stainless steel] [____].
Exterior face of door; [prefinished steel] [stainless steel] [____].]

2.3 SPECIAL OPERATION AND CONTROL

Provide all special operations and control systems in accordance with ASME A17.1.

2.3.1 Firefighters' Service

NOTE: Firefighter Service is required on all freight and passenger elevators. Coordinate the Firefighters' designated floor level with the local base Fire department and edit following paragraph.

Provide equipment and signaling devices. The designated level for Firefighters' key operated switch is the [ground] [____] floor.

2.3.2 Smoke Detectors

Smoke detectors are specified in [Section 13852N INTERIOR FIRE DETECTION AND ALARM SYSTEM] [____], including conduit and wiring from each detector to elevator machinery space control panel. Provide connections directly to elevator controls that will, when smoke is detected by any smoke detector, actuate Firefighters' Service and send each elevator to the correct floor as required by ASME A17.1. Provide dual-contact smoke detectors located in the elevator lobbies and the elevator machine room. If a sprinkler is provided at the top of the hoistway, provide dual-contact smoke detector at top of hoistway. The circuit for elevator controller actuation of Firefighters' Service shall include only these smoke detectors. In lieu of dual-contact smoke detectors, an addressable fire alarm system with listed smoke detectors can be used in the above stated locations. Ensure that all

smoke detectors are mounted on finished ceiling.

2.3.3 Fire Sprinklers

NOTE: Elevator installations in buildings protected in accordance with NFPA 13 require sprinklers in each elevator machinery room, except buildings protected in accordance with NFPA 13R. Electric traction elevators are required to have a 2 hour rated hoistway, which does not require sprinklers. If a two hour rated hoistway cannot be achieved, sprinklers are required and the bracketed option for sprinklers in the hoistway shall be included. Elevators in Italy shall not have sprinklers in elevator machine rooms, hoistways, or elevator pits.

Provide fire sprinklers in accordance with Section [13930A WET PIPE SPRINKLER SYSTEM, FIRE PROTECTION] [13930N WET-PIPE FIRE SUPPRESSION SPRINKLERS]; providing dual contact flow switch, check valve, and shutoff valve in each sprinkler line immediately outside of each machine room [and top of hoistway]. Provide electrical connection to fire sprinkler system in accordance with Section 16402 INTERIOR DISTRIBUTION SYSTEM. For each elevator, provide control wiring connecting the flow switch to the shunt trip equipped circuit breaker within the electrical panel serving the main line disconnect. Upon flow of water, flow switch shall instantaneously send a signal to cause opening of shunt-trip equipped mainline circuit breaker, in compliance with ASME A17.1, Section 2.8.2, and send a signal to fire alarm control panel to indicate water flow condition. Machine room sprinkler flow switch actuation shall shunt trip all elevator(s) served by the machine room. [Hoistway sprinkler flow switch actuation shall shunt trip all elevator(s) in the hoistway.]

2.3.4 Top-of-Car Operating Device

Provide, per ASME A17.1, operating device mounted on or from car crosshead, to permit operation of car at 0.75 mps 150 fpm maximum for adjustment, maintenance, testing, and repair. Include integral or remote safety device, continuous pressure "UP" and "DOWN" switches or buttons, emergency stop switch, and inspection switch.

2.3.5 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 1800 mm 6 feet above floor level, within 300 mm 12 inches of hoistway entrance frame or with only ferrule exposed when located in entrance frame.

2.3.6 Independent Service

NOTE: Use the last bracketed sentence when there are two or more cars in group.

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. [If one car is removed from group, provide other car(s) responding to its hall call.]

2.3.7 Elevator Operation

NOTE: Choose one of the following four types of operations: Single Two-Stop Automatic, Selective Collective Automatic, Duplex Selective Collective or Group Automatic.

2.3.7.1 Single, Two-Stop, Automatic Operation

NOTE: Specify for Single, Two-Stop elevator only.

Provide Single Two-Stop Automatic Operation. Provide illuminating push buttons.

2.3.7.2 Selective Collective Automatic Operation

NOTE: Specify for single elevator serving three or more landings.

Provide Selective Collective Automatic Operation. Provide illuminating push buttons.

2.3.7.3 Duplex Selective Collective Automatic Operations

NOTE: Specify for two adjacent elevators.

Provide Duplex Selective Collective Automatic Operation. Provide a single push button for terminal landings and dual push buttons, up and down, at intermediate landings. In each car operating panel, provide push buttons numbered to correspond to each landing. 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 elevator functioning as a Selective Collective elevator until the out-of-service car is returned to the system. Provide a push-button riser adjacent to each elevator.

2.3.7.4 Group Automatic Operation

NOTE: Specify for three or more adjacent elevators.

Provide Group Automatic Operation. Provide a single push button for terminal landings and dual push buttons, up and down, at intermediate landings. In each car operating panel, provide push buttons numbered to

correspond to each landing. 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 the out-of-service car is returned to the system. Provide a push-button riser adjacent to each elevator.

2.3.8 Parking Switch

NOTE: Specify parking switch if there is a definite reason to change parking station daily or for security purposes. For example, to provide night shut down of a car for security reasons. Indicate parking floor.

Provide two-position parking switch in car station service cabinet. One position causes car to remain parked at floor landing where last used; other position causes car to park at [main] [_____] floor.

2.3.9 Hospital Emergency Commandeering Service

NOTE: Commandeering Service can be used for priority service. Duplication of keys by unauthorized persons is possible. The designer must determine whether security of individuals or quickness in obtaining car is governing consideration for each project. Verify with facility personnel that control of key duplication can be maintained.

[Provide "ON-OFF" key switch and indicator light at [designated] [all] landings to cause one elevator to respond directly to the landing activated. Turning switch to "ON" position cancels previously registered "CAR" calls and requires car to bypass hall calls while in route to activated landing. On arrival, car will remain at landing with hoistway and car doors open for predetermined time to permit car to be placed on emergency service. If the person decides not to use car during predetermined time period, car door will close and car will automatically return to normal service. Provide indicator lights that automatically illuminate during emergency service. Key shall be removable only in "OFF" position.]

2.4 ELEVATOR MACHINE

NOTE: Use geared traction machines up to nine floors with moderate-to-heavy traffic demand, generally not more than three or four cars in a group and for speeds not exceeding 1.75 mps (350 FPM). Use gearless traction for speeds beyond 1.75 to 2.00 mps (350 to 400 FPM), for ten floors or more and where intensive traffic is anticipated, i.e., high-rise hospitals, busy headquarters, office buildings. Gearless elevators are often used in large hospitals for six or more stops. However if 2.00 mps (400 FPM) is required, the elevator

industry usually supplies 2.50 mps (500 FPM) as the standard entry for gearless traction machines. Use generator field control for all applications of gearless elevators and most geared elevators. For motors greater than 11 kw (15 hp), use power factor correcting capacitors to increase power factor to minimum 90 percent.

Elevator machines shall be [[worm] geared] [or] [gearless] traction, direct-drive machines. Paint or finish ferrous surfaces with minimum one coat of rust-inhibiting paint conforming to manufacturer's standard practice. Direct current drive motor shall conform to NEMA MG 1, Part 18, hoisting motor with separately excited direct current (dc) generator. Provide drive motor with Class F insulation, and rated for continuous duty.

2.5 CONTROL EQUIPMENT

2.5.1 Motor Control Equipment

NOTE: At sites where power fluctuations are routinely experienced, specify only variable-voltage with motor generator set.

ASME A17.1, Section 2.26. Provide [variable voltage with silicon controlled rectifier (SCR)], [variable-voltage with motor-generator set], or [variable-frequency alternating current (ac) drive control]. Enclose control equipment in factory-primed and baked-enamel coated sheet-metal cabinets with removable or hinged doors with ventilation louvers.

2.5.1.1 [SCR Control or Variable Voltage Variable Frequency (VVVF) AC Control

Provide individual isolation transformers and individual choke reactors for each individual hoist motor. Provide filtering to maintain harmonic distortion below IEEE standards as measured at the elevator machine room disconnect.]

2.5.1.2 [Motor Generator Set

[NEMA MG 1, Part 18. Provide motor-generator set with Class F insulation, and rated at 120 starts per hour for elevator service. Maximum acceptable generator voltage is 600 volts. Indicate direction of rotation by an arrow embossed, engraved, stamped, or cast on the frame. Enclose electric connections at motor generator set in conduit boxes. Provide adjustable timing device that will automatically shut the set off at [20 to 30 seconds] [3-minute] predetermined time after the elevator has answered the last registered call.]]

2.5.2 Logic Control

NOTE: Use microprocessors for elevator logic control. However, solid state control is not desirable for any facility which is subject to an erratic building power supply, or at a remote/island location. In this situation, specify an

electromagnetic switch, relay logic controller. The mechanical design for the elevator machine room must include the HVAC recommended by the control system manufacturer.

[Provide commercially available microprocessor controller to enable programmable control of call allocation, logic functions, door control, speed sensing and car position. Provide a comprehensive and unrestricted method of accessing the microprocessor memory for elevator diagnostic purposes and a method of reprogramming adjustable parameters of computerized controls. Store all programming in non-volatile memory. The microprocessor control system is acceptable only if all hardware, software, and software documentation required to maintain and utilize the microprocessor is provided, and training is provided to Government Personnel by the equipment manufacturer and supplier.]

2.5.2.1 On-Board Diagnostic Panel

Provide, for each individual elevator microprocessor controller, 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, maintenance, and testing of the elevator. For each elevator group control, provide a separate on-board diagnostic control and LCD display panel that allows unrestricted access to the comprehensive range of options and adjustments necessary to perform installation, adjusting, maintenance, and testing of the elevator group. The LCD displays shall also provide 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 shall 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.

2.5.2.2 External Port

For each individual elevator microprocessor controller, and elevator group microprocessor controller, provide a USB port or an RS 232 port that allows connection to an on-site or a remote portable laptop computer. Provide the same level of unrestricted access as the on-board diagnostic panel. Provide three (3) copies of the complete manufacturer's software program, with complete software documentation, that shall 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 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 shall not require recharging to maintain their memory or authorization for use. Software shall not require periodic reprogramming, or reauthorization. Programs shall be stored in

non-volatile memory. [Provide electromagnetic switch, relay logic controller, complete with three (3) copies of the ladder diagram, fully cross-referenced and annotated, with the complete sequence of operations.]

2.6 OPERATING PANELS, SIGNAL FIXTURES, AND COMMUNICATIONS CABINETS

2.6.1 Capacity and Data Plates

Attach faceplates with spanner security screws. On car panel, provide stainless steel capacity and data plates, with name of elevator manufacturer.

2.6.2 Car and Hall Buttons

NOTE: Use item "b." for freight elevators with power-operated bi-parting doors. The number and size of hall car stations will be indicated on the drawings.

- a. Provide recessed tamper-proof push buttons of minimum 19 mm 3/4 inch size satin-finish stainless steel with illuminating jewel center.
- b. Identical in size and design to hall call buttons, but not illuminating.

2.7 PASSENGER CONTROLS

2.7.1 Passenger Car-Operating Panel

NOTE: Use two car operating panels per car for busy passenger elevators in hospital buildings and office buildings. Use one car operating panel per car for single or two elevator systems where traffic is moderate, such as in barracks, warehouses, clinics or shops. For front and rear openings at a floor, provide two floor buttons marked "F" and "R" for operating door open and close.

Provide each car with [one] [two] car operating panel(s) that contain(s) operation controls and communication devices. Provide exposed, flush mounted buttons for the controls that must be passenger accessible. Provide service cabinet or keyed switches for those switches that should not be passenger accessible. Allow maximum 1200 mm 48 inches between car floor and center line of top operating buttons. Allow 900 mm 35 inches between car floor and center line of bottom button. Use engraving and backfilling or photo etching for button and switch designations. Do not use attached signs.

2.7.1.1 Passenger Controls

NOTE: Omit the paragraph regarding phone jack unless specifically requested by the activity.

- a. Illuminating operating call buttons identified to correspond to landings served by elevator car. [For two openings at a floor, provide two buttons, marked "FRONT" and "REAR" above buttons.]
- b. "DOOR OPEN" and "DOOR CLOSE" buttons.
- c. Keyed "STOP" switch in accordance with ASME A17.1, rule 2.26.2.
- d. "ALARM" button in compliance with UFAS, ADA, and ASME A17.1, rule 2.27.1. Alarm button shall be red with engraved legend "ALARM." Alarm button shall illuminate when pushed. Locate "ALARM" button at panel bottom.
- e. "FIRE DEPARTMENT" key switch, with "OFF-HOLD-ON" positions, in that order with key to be removable in all positions. Provide fire sign or jewel, and audible signal device, in accordance with ASME A17.1 Section 2.27.3. Both visual and audible signals are activated when Phase I key switch in hall is activated or when smoke detector activates return of elevator(s) to main fire response floor. Visual and audible signal shall remain activated until car has reached main or designated alternate fire response floor. Upon arrival at fire response floor visual signal remains illuminated and audible signal becomes silent.
- f. Emergency two-way communication. Provide momentary pressure, single illuminating pushbutton operated communication device that complies with ASME A17.1, UFAS, and the Americans with Disabilities Act.
- [g. Key-operated on-off "HOSPITAL EMERGENCY COMMANDEERING SERVICE" switch.]
- [h. Sound-actuated firefighter phone jack.]

2.7.1.2 Service Controls

- a. Inspection switch that transfers car control to top-of-car inspection operating controls and prevents car operation from in-car control panel.
- b. Independent service switch.
- c. Two car light switches, one for light in car and one for lights on top and bottom of car frame.
- d. Fan switch, two-speed.
- e. 120-volt ac 60 Hz single-phase duplex electrical outlet of ground-fault-circuit-interrupt (GFCI) design.
- f. Device for communication between car and elevator machine room.
- [g. Parking switch.]

2.7.1.3 Certificate Window

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

[2.7.2 Freight Car-Operating Panel

Provide 3 mm 1/8 inch thick stainless steel face plate with edges relieved.

Provide a car operating panel (COP) for each car at each car entrance.

Provide exposed, flush mounted buttons for the controls that must be passenger accessible. Provide service cabinet or keyed switches for those controls that should not be passenger accessible. Allow maximum 1200 mm 48 inches between car floor and center line of top operating button. Allow 900 mm 35 inches between car floor and center line of bottom button. Use engraving and backfilling or photo etching for button and switch designations. Do not use attached signs.]

2.7.2.1 Passenger Controls

**NOTE: Omit the paragraph regarding phone jack
unless specifically requested by the activity.**

a. Illuminating operating call buttons identified to correspond to landings served by elevator car. [For two openings at a floor, provide two buttons marked "FRONT" and "REAR" above buttons.]

b. Manual "STOP" switch.

c. "ALARM" button in compliance with UFAS, ADA, and ASME A17.1, Section 2.27.1. Alarm button shall be red with engraved legend "ALARM". Alarm button shall illuminate when pushed. Locate "ALARM" button at panel bottom.

d. "FIRE DEPARTMENT" key switch, with "OFF-HOLD-ON" positions, in that order with key removable in all positions. Provide fire sign or jewel and audible signal device. Both visual and audible signals are activated when Phase I key switch in hall is activated or when smoke detector activates return of elevator(s) to main fire response floor. Visual and audible signal shall remain activated until car has reached designated or alternate fire response floor. Upon arrival at fire response floor visual signal remains illuminated and audible signal becomes silent.

e. Emergency two-way communication. Provide momentary pressure, single illuminating pushbutton operated communication device that complies with ASME A17.1, UFAS, and the Americans with Disabilities Act.

[f. Key-operated on-off "HOSPITAL EMERGENCY COMMANDEERING SERVICE SWITCH".]

[g. Sound-actuated firefighter phone jack.]

2.7.2.2 Service Controls

**NOTE: Use "DOOR OPEN" and "DOOR CLOSE" buttons for
power-operated doors and gate.**

a. Inspection switch that transfers car control to top-of-car inspection operating controls and prevents car operation from in-car control panel.

- b. Independent service switch.
- c. Two car light switches, one for light in car and one for lights on top and bottom of car frame.
- d. Fan switch, two-speed.
- e. 120-volt ac 60 Hz single-phase duplex electrical outlet of ground-fault-circuit-interrupt (GFCI) design.
- f. Communication device between car and elevator machine room.
- [g. Parking switch.]
- [h. "DOOR OPEN" and "DOOR CLOSE" buttons.]

[2.7.2.3 Certificate Window

Provide a minimum 100 mm high by 150 mm wide 4 inches high by 6 inches wide, certificate window in car operating panel for elevator inspection certificate.]

[2.7.3 Semi-Selective Door Operation

NOTE: Use semi-selective operation for elevators with rear openings but no landing with both front and rear openings. Use full selective if, at any floor, there are both front and rear openings. This applies to both passenger and freight elevators.

For elevator with rear opening at elevations differing from front opening, provide semi-selective door operation so that only car door or gate adjacent to hoistway door opens when car stops.]

[2.7.4 Full-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.]

2.7.5 Switches and Devices

Provide elevator manufacturer's standard grade for switches and devices on car operating panel. Legibly and indelibly identify each device and its operating positions. Locate car dispatching buttons in identical positions in car operating panels for corresponding floors.

2.7.6 In-Car Position and Direction Indicator and Signal

In-car direction indicator shall be included in the in-car position indicator fixture.

2.7.6.1 In-Car Position Indicator and Signal

Provide horizontal electrical or electronic digital position indicator located minimum of 2135 mm 84 inches above car floor. Arrange indicator to show floor position of car in hoistway and its traveling direction. Indicate position by illumination of numeral or letter corresponding to landing at which car is passing or stopping. Provide audible signal to alert passenger that elevator is passing or stopping at a floor. Provide audible signals exceeding ambient noise level by at least 20 decibels with frequency not higher than 1500 Hz.

2.7.6.2 In-Car Direction Indicator and Signal

Provide visual and audible car direction indicators in car, indicating car traveling direction. For visual directional signal, provide arrow of minimum 65 mm 2 1/2 inches in size. Use equilateral triangles for arrows, green for upward direction and red for downward direction. Provide audible signal that sounds once for upward direction and twice for downward direction.

2.7.7 Landing Position and Direction Indicator and Signal

Provide a single fixture containing the landing position and direction indicator.

2.7.7.1 Landing Position Indicator and Signal

Provide an electrical or electronic digital position indicator similar to the car position indicator. Arrange position indicator in wall horizontally above the door frame or vertically at the side of the door frame. Indicators to show floor position of car in hoistway. Indicate position by illumination of numeral or letter corresponding to landing at which car is passing or stopping.

2.7.7.2 Landing Direction Indicator and Signal

Provide landing direction indicator with visual and audible signal devices. Provide single direction indicator at terminal floors; "UP" and "DOWN" direction indicator at intermediate floors. Provide equilateral triangles not less than 65 mm 2 1/2 inches in size, green for upward direction and red for downward direction. Provide electronic audible device that sounds once for upward direction and twice for downward direction. Provide audible signals exceeding ambient noise level by at least 20 decibels with frequency not higher than 1500 Hz.

2.8 HOISTWAY AND CAR EQUIPMENT

2.8.1 Car and Counterweight Guide Rails and Fastenings

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

2.8.2 Car and Counterweight Buffers

**NOTE: Use spring buffers for speeds up to and
including 1.00 mps (200 fpm).**

Provide data plate on each buffer.

2.8.3 Pit Equipment

Provide pit channel for anchorage of main guide rail brackets and also for anchorage of counterweight guide rail brackets. Each channel shall span distance between guides. In addition, pit channel for main guide rails shall serve as mounting surface for car buffer(s). Pit channel for counterweight guide rails shall serve as mounting surface for counterweight buffer(s). Method of installation of channels, brackets and buffer mounts shall be such that pit waterproofing is not punctured. On completion of guide rail and buffer installation, both pit channels shall be fully grouted.

2.8.3.1 Pit "STOP" Switch

Provide push/pull type pit "STOP" switch for stopping elevator motor, independent of regular operating device. Locate switch on same side of hoistway as ladder.

2.8.3.2 Ladder

NOTE: Pits over 900 mm (3 feet) deep require a
ladder which is usually included in Section 05500N
METAL FABRICATIONS. Use the second bracketed option
in the following paragraph when Section 05500A is
not included in project specification.

[Section [05500A MISCELLANEOUS METALS] [05500N METAL FABRICATIONS].]
[Provide galvanized steel ladder conforming to 29 CFR 1910.27 with minimum
178 mm 7 inch distance between rung and wall.] Locate ladder on hoistway
side wall closest to hoistway door opening.

2.8.3.3 Lighting of Pits

Locate pit light not less than 1800 mm 6 feet above pit floor. Locate switch on same side of hoistway as ladder. Provide GFCI duplex receptacle in each pit.

2.8.4 Wiring and Traveling Cables

NFPA 70, Article 620 and Section 16402 INTERIOR DISTRIBUTION SYSTEM.
Suspend traveling cables by means of self-tightening webbed devices.

2.8.5 Emergency Signaling Devices

Provide audible signaling device, operable from Car Operating Panel button marked "ALARM". The audible signaling device shall be mounted in hoistway.
[In addition, for freight elevators, operation of the EMERGENCY STOP button shall sound audible signaling device.]

2.9 PASSENGER CAR AND HOISTWAY DOOR ACCESSORIES

ASME A17.1, Sections 2.12, 2.13, 2.14, and 3. Provide Infrared Curtain Unit (ICU) with multiple infrared beams that protect to the full height of the door opening. Minimum coverage shall extend from 50 mm 2 inches off the floor to 1778 mm 70 inches above floor level. Door operation must meet

the requirements of ASME A17.1 Rule 2.27.1 and 2.13.5. Provide high-speed electric operator, safety interlocks for car and hoistway doors, and electric safety contact to prevent car operation unless doors are closed. [Provide electrical circuitry that restores car to service at a specified time lapse with time out circuitry as an option for intensive service elevators.]

2.10 PASSENGER ELEVATOR GUIDES, PLATFORM, AND ENCLOSURE

NOTE: User roller guide assemblies on all passenger elevators.

2.10.1 Roller Guides

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

2.10.2 Car Enclosure, Car Door, and Car Illumination

NOTE: For hospital service, consider providing separate elevators for routine hospital service and passenger service.

Provide natural and forced ventilation, emergency exit, and stainless-steel hooks with fire retardant protective pads.

2.10.2.1 Car Shell Return Panels, Entrance Columns, Cove Base, and Transom

Provide 1.9 mm 14 gage minimum non perforated steel. Apply sound-deadening mastic on all exterior components.

2.10.2.2 Car Top

Provide reinforced 2.66 mm 12 gage minimum steel with hinged emergency exit openable by hand from car top only. Provide electrical contact which prevents operation of elevator when emergency exit is open. Provide sound-deadening mastic on all exterior components.

2.10.2.3 Car Door

Provide 1.5 mm 16 gage minimum stainless steel, sandwich construction without binder angles. Provide a minimum of 2 door guide assemblies per door panel, one guide at leading and one at trailing door edge with guides in the sill groove their entire length of travel.

2.10.2.4 Car Entrance Sill

Provide one piece cast white bronze or nickel silver entrance sill. Set sills level and flush with floor finish. Use same material for hoistway and car entrance sills.

2.10.2.5 Carpet

Unless otherwise specified, the elevator shall be carpeted.

2.11 PASSENGER ELEVATOR HOISTWAY DOORS AND ENTRANCES

Provide hoistway entrance assemblies with a minimum 1.5 hour fire rating.

2.11.1 Hoistway Entrance Frames

NOTE: Coordinate materials with paragraph "ELEVATOR DESCRIPTION".

1.8 mm 14 gage thick [stainless steel] [or] [prefinished carbon sheet steel]. Solidly grout uprights of entrance ways to height of 1500 mm 5 feet.

2.11.2 Hoistway Entrance Sills

Provide one-piece cast solid white bronze or nickel silver entrance sills. After sill is set level and flush with finished floor height, solidly grout under full length of sill. Use same materials for hoistway and car door sills.

2.11.3 Hoistway Entrance Doors

Provide hoistway entrance door constructed with hollow metal non-vision construction with flush surfaces on car and landing sides. Provide a minimum of 2 door guide assemblies per door panel, one guide at leading edge and one at trailing door edge with guides in the sill groove the entire length of travel. Provide sheet metal hoistway door track dust covers at each landing. Dust covers must cover door locks and door roller tracks and extend the full width of the door track and associated hardware.

2.11.4 Entrance Fascias and Dust Covers

Provide sheet metal hoistway door track dust covers at each landing. Dust covers must cover door locks and door roller tracks and extend the full width of the door track and associated hardware.

2.11.5 Hoistway Ventilation

Provide hoistway ventilation directly to outside air by fixed louver through side wall of hoistway at top of hoistway. Net size of the louver shall be at least 3.5 percent of cross section of hoistway.

2.12 FREIGHT ELEVATOR GUIDES, PLATFORM, AND ENCLOSURE

NOTE: Use roller guide assemblies on all freight elevators.

2.12.1 Roller Guides

Provide roller guide assemblies in adjustable mountings on each side of car and counterweight frames in accurate alignment to top and bottom of frames.

2.12.2 Car Enclosure

NOTE: Use two-section car gate if headroom is

insufficient for single section.

Complete with [two-section] [vertical rising] gate, power gate operator, emergency exit, emergency light, and lighting fixtures. Paint interior and exposed surfaces with manufacturer's standard finish. Provide certificate frame and recessed car station.

2.13 FREIGHT ELEVATOR HOISTWAY DOORS AND ENTRANCES

NOTE: If hoistway doors are for exterior uses, weather stripping does not provide practical protection. In lieu of weather stripping, incorporate alcoves to protect edges and bottom surfaces of exterior doors from rain, snow, and ice.

Provide hoistway entrance with complete door assembly including door panels with truckable sill, frames, guide rails, and accessories. Provide hoistway entrance assemblies that have a minimum 1.5 hour fire rating.

2.13.1 Door Panel

Fire rated door panel, with minimum 100 mm wide by 225 mm high 4 inch wide by 9 inch high vision panel at upper door section.

2.13.2 Door Operation

NOTE: Use semi-selective if only one opening at any floor; full-selective if two openings at any floor.

[Semi-selective] [Full-selective].

2.14 HANDICAPPED AND MEDICAL SERVICES ACCESS

2.14.1 Provision for Handicapped

NOTE: Use on all elevators.

36 CFR 1191, Sections 4.10 for Elevators, 4.30 for Signage, and 4.31 for Telephones.

2.14.2 Emergency Medical Services

NOTE: Use the following for buildings of four stories or more in height.

ICC IBC, Chapter 30 for elevators and signage.

2.15 EMERGENCY POWER OPERATION

**NOTE: Use in hospitals and any building in which
sufficient standby power is provided to operate one
or more elevators.**

Upon outage of normal power and initiation of emergency power, provide circuitry and wiring to operate elevator [telephone] [and] [intercom] to accomplish operation sequences. [In multiple elevator system, one elevator travels automatically to the main floor, opens doors, and shuts down. Thereafter, each other elevator in group, one at a time returns automatically to main floor. After all cars have returned to main floor, provide automatically one [passenger] [freight] car in regular service.] [For single elevator system, elevator travels automatically to main floor, opens doors, and automatically places itself in regular service.] During emergency power operation, provide a sign reading "EMERGENCY POWER" flashing in each car station. [At the same time, provide operable Firefighters' Service.]

2.16 PROVISIONS FOR EARTHQUAKE PROTECTION

**NOTE: Provide seismic protection as covered by
ASME A17.1, Section 8.4. Provide fastenings,
attachments, and restraints for prevention of
seismic damage in detail by registered structural
engineer whose seal is applied to drawings or
sketches. Use forces of 1.0 G horizontal and 1.0 G
vertical or heavier.**

The facility shall comply with all ASME A17.1, Part 8.4 requirements as applicable by location.

2.17 ALTERNATIVE INSTALLATION

Upon approval of the customer on an individual basis, [and for Navy projects, only upon written prior approval by the Navy Elevator Program Manager,] a machine-room-less elevator system alternative may be utilized in-lieu-of elevators which require a machine room. Machine-room-less elevators can be specified where optimizing building and energy efficiency is desired. Machine-room-less type elevators can be selected for speeds from 0.75 m/s 150 feet per minute up to 1.75 m/s 350 feet per minute. Hoisting machinery is located in the hoistway at the top of the shaft with controls located either in a control room or a control space at the top landing adjacent to the hoistway. Units shall comply with all applicable requirements of this specification in addition to the manufacturers specifications.

PART 3 EXECUTION

3.1 INSTALLATION

Install in accordance with manufacturer's instructions, ASME A17.1, 36 CFR 1191, and NFPA 70.

3.1.1 Traveling Cables

Do not allow abrupt bending of traveling cables.

3.1.2 Structural Members

Do not cut or alter. Restore any damaged or defaced work to original condition.

3.1.3 Safety Guards

Selector cables or tapes exposed to possibility of accidental contact in machine room shall be completely enclosed with 1.5 mm 16 gage thick sheet metal or expanded metal guards, both horizontally and vertically. Exposed gears, sprockets, and selector drums shall be guarded from accidental contact in accordance with ASME A17.1.

3.1.4 Miscellaneous Requirements

Include 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.

3.1.5 Firefighters' Service

Firefighters' service shall be complete including installation and wiring of all smoke detectors in accordance with ASME A17.1, Section 2.27.3.2. Coordinate smoke detector installation for firefighters' service.

3.2 FIELD QUALITY CONTROL

After completing elevators system installation, notify Contracting Officer that elevator system is ready for final inspection and acceptance test. [Contracting Officer will obtain services of Naval Facilities Engineering Command certified elevator inspector.] Contractor shall perform all required tests and demonstrate proper operation of each elevator system and prove that each system complies with contract requirements and ASME A17.1, including Section 8.10.3, "Acceptance Inspection and Tests of Passenger and Freight Hydraulic Elevators", and the applicable requirements of Section 8.3, "Engineering and Type Tests". Inspection procedures in ASME A17.2.1 form a part of this inspection and acceptance testing. All testing and inspections shall be conducted in the presence of both the Elevator Specialist and the Elevator Inspector. Demonstrate the proper operation of all equipment at various date settings, selected by the Elevator Inspector, ranging from the date of contract award through 1 January 2099. The Elevator Inspector shall complete, sign and post the results of all tests and inspection results [and form NAVFACENGCOM 9-11014/23 (Rev. 7-88), Elevator Inspection Certificate] 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.]

3.2.1 Testing Materials and Instruments

Provide testing materials and instruments required for final inspection. Include calibrated test weights, tachometer, 600-volt megohm meter, volt meter and ammeter, three Celsius calibrated thermometers, door pressure gage, spirit level, stop watch, hydraulic pressure test gauge, and a 30 meter 100 foot tape measure.

3.2.2 Field Tests

3.2.2.1 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. The requirements for Rated Speed, Leveling, Temperature Rise, and Motor Amperes testing specified herein shall be met throughout the duration of the Endurance test.

3.2.2.2 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 before and immediately after Endurance test. Determine speed by tachometer reading, excluding accelerating and slow-down zones per ASME A17.2.1. Minimum acceptable elevator speed is the Rated speed specified. Maximum acceptable elevator speed is 110 percent of Rated speed.

3.2.2.3 Leveling Tests

Test elevator car leveling devices for landing accuracy of plus or minus 6 mm 1/4 inch at each floor with no load in car, symmetrical load in car, and with rated load in car in both directions of travel. Determine accuracy of floor landing both before and immediately after endurance tests.

3.2.2.4 Insulation Resistance Tests

Perform tests to ensure wiring systems free from short circuits and grounds. Minimum acceptable insulation resistance for electrical conductors is one megohm between each conductor and ground and between each conductor and other conductors. Prior to megohm meter test, make provision to prevent damage to the electronic devices.

3.2.2.5 Brake Test

Conduct brake test with 125 percent of rated load in elevator. Verify that brakes stop and hold elevator with 125 percent of rated load.

3.2.2.6 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 shall not exceed acceptable temperature rise indicated on manufacturer's data plate. Start test only when equipment is within 5 degrees C 9 degrees F of ambient temperature.

3.2.2.7 Balance Tests

Perform electrical and mechanical balance tests of car and counterweight.

3.2.2.8 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.

3.3 Operation and Maintenance Training

The Elevator Specialist shall instruct Government personnel in care, adjustment, and maintenance of elevator equipment for a period of not less than [5] [_____] working days immediately following acceptance of system. The Contractor shall submit Operation and Maintenance Manuals as required in the Submittals paragraph.

-- End of Section --