
USACE / NAVFAC / AFCEC UFGS-14 21 23.02 33 (August 2024)

KOREA EDITED SPECIFICATION (KES)

Preparing Activity: NAVFAC

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2025

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SECTION 14 21 23.02 33

ELECTRIC TRACTION PASSENGER ELEVATORS, KOREA EDITED SPECIFICATION (KES)

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NOTE: This guide specification covers the requirements for electric traction passenger 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 USFK facility designs which include elevators must comply with the latest UFC 3-490-06 Elevators. This guide is available from the WBDG website at <https://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc>

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

For Air Force and Space Force projects, editing of non-bracketed requirements must be approved through the Air Force VTE SME, AFCEC.

For Army projects, editing of non-bracketed requirements must be approved through the Army Elevator SME, HQUSACE.

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 CIVIL ENGINEERS (ASCE)

ASCE 7-22 (2022; Supp 1 2023; Supp 2 2023) Minimum Design Loads and Associated Criteria for Buildings and Other Structures

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME A17.1/CSA B44 (2022) Safety Code for Elevators and Escalators

ASME A17.2 (2023) Guide for Inspection of Elevators, Escalators, and Moving Walks

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M (2025) Structural Welding Code - Steel

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 (2024) 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 (2026) National Electrical Code

NFPA 70E (2024) Standard for Electrical Safety in
the Workplace

NFPA 72 (2025) National Fire Alarm and Signaling
Code

NFPA 101 (2024) Life Safety Code

REPUBLIC OF KOREA (ROK) LAW

ROK ESMA (31 January 2025) Elevator Safety
Management Act (ESMA), No. 20159

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-560-01 (2017; with Change 3, 2023) Operation 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

UL SOLUTIONS (UL)

UL 1561 (2011; Reprint Aug 2023) Dry-Type General
Purpose and Power Transformers

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 and Air Force projects.

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are 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 Component Assemblies; G, [_____]

Elevator Machine; G, [_____]

Elevator Controller; G, [_____]

Wiring Diagrams; G, [_____]

SD-03 Product Data

Elevator and Accessories; G, [_____]

Elevator Components; G, [_____]

Data Sheets; G, [_____]

Elevator Controller; G, [_____]

SD-05 Design Data

Emergency Power Systems

Heat Loads

Reaction Loads

SD-06 Test Reports

Acceptance and Field Tests; G, [_____]

Sound and Acceleration Tests; G, [_____]

SD-07 Certificates

Elevator Parts and Components Price Lists; G, [_____]

Warranty

Endorsement Letter

Welders' Qualifications

SD-10 Operation and Maintenance Data

Elevator, Data Package 4; G, [_____]

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

Software and Documentation; G, [_____]

1.2.1 Shop Drawing Requirements

Provide assembly and arrangement of elevators, accessories, and elevator component assemblies. Show location of elevator machine in elevator machine room (MR) or 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, hoist machine and drive motor, design counterbalance, hoist ropes and shackles, overspeed governor, emergency braking system, car and hall fixture buttons and switches, cab, machine room, control room, and machinery space communication devices, door operator, door protection system, and car and counterweight 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, or ROK ESMA.

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. Calculations must comply with ASCE 7-22 and ASME A17.1/CSA B44, or ROK ESMA.

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 for installation of HVAC equipment to maintain elevator machine room or control room temperature between 21 and 32 degree C and relative humidity between 35 percent and 60 percent at all times and

in all weather conditions.

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 elevator sequential operation and 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 in its entirety. Include 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 and install in each elevator machine room (MR), machinery space (MS), control room (CR), or control space (CS). 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.

In case of a conflict between the specifications requirements and the codes referenced to in the REFERENCES paragraph, follow the specifications requirements. Submit elevator manufacturer's Certificate of Compliance attesting to compliance with this requirement. Spare parts for the elevator system provided must be continuously available after acceptance

of the system, and compatible parts must be continuously available for the life of the elevator. *Note: Electrical power on base is American standard nominal voltage 120/208V, 277/480V. Elevators requiring different voltage may be used, but it will be the responsibility of the contractor to provide for appropriate voltage. Electrical distribution system adjustments must be submitted for approval.*

1.3.1.1 Elevator Contractor's Elevator Technicians

For elevator installations, perform all elevator related work under the direct guidance of a certified elevator technician with a minimum of 3 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)
- c. Human Resources Development Service of Korea (HRDK)

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 mm](#) 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](#). 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 24 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 without additional cost to the Government within warranty period. Perform service only by factory trained personnel. Provide Monthly preventive maintenance services in strict accordance with the manufacturer's O&M manual to include but not limited to repairs, adjustments, greasing, oiling, and cleaning. Provide service log in elevator machine room or control room cabinet and update Monthly, throughout the warranty period.

**NOTE: One hour emergency service below is standard;
only use 2 hour for remote locations.**

Provide 24-hour emergency service, with 1 hour on-site response time, during this period without additional cost to the Government.

1.4.1 Periodic Elevator Certification Inspection and Testing

**NOTE: Use QEI (Qualified Elevator Inspector) for
elevator systems that comply with U.S. standards.
Use KoELSA Elevator Inspector for elevator systems
that comply with local standards.**

Provide[QEI (Qualified Elevator Inspector)][KoELSA (Korea Elevator Safety Agency) Elevator Inspector], Periodic Elevator Certification Inspection and Testing, throughout warranty period. Provide elevator mechanic to support contractor hired third party[QEI][KoELSA Elevator Inspector] contracted to the prime in the periodic 6-month and annual Category 1 elevator certification inspection and testing throughout the warranty period. Perform the final warranty period category 1 inspection and testing no greater than 30 days prior to the end of the warranty period. Signed[QEI][KoELSA Elevator Inspector] Certificate must be displayed inside of each elevator cab after successful acceptance inspection or each category 1 inspection. Perform all elevator certification inspection and testing in the presence of[QEI][KoELSA 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 70 INTERIOR FIRE ALARM SYSTEM, ADDRESSABLE;][Section 28 31 76 INTERIOR FIRE ALARM AND MASS NOTIFICATION SYSTEM, ADDRESSABLE;][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 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.

1.5.4 Fire Service Access Elevator System Monitoring

Where one or more elevators are specifically designated and marked as fire service access elevators, temperature and presence of smoke in elevator lobbies, machine rooms, control rooms, machinery spaces, or control spaces must be continuously monitored and displayed on a building fire alarm system annunciator(s), or other annunciator(s) as approved by the authority having jurisdiction.

PART 2 PRODUCTS

2.1 ELEVATOR DESCRIPTION

Provide elevator system that complies with ASME A17.1/CSA B44 or ROK ESMA in its entirety, ASME A17.2 in its entirety, and additional requirements specified herein. The specified requirements herein must take precedence if there are any conflicts with the codes. Material and equipment must be listed on the shop drawing, and listed or certified by OSHA NRTL (Nationally Recognized Testing Laboratories) or by KoELSA Testing Laboratory. Provide elevator system that meets or exceeds the NEII-1 Ride Quality Performance Standards Matrix (RQPSM). For elevator speeds of 150 m/min and higher, comply with the RQPSM "High Performance" criteria. For elevator speeds 105 m/min, up to but not including 150 m/min, 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 UFC 3-490-06 Elevators to determine Design Type. For minimum elevator speed, specify 60 m/min for 2-4 story, 105 m/min for 5-9 story, and 150 m/min, gearless for 10-or-more story elevators.

Specify gearless traction elevators for all buildings more than 10 stories tall.

Size and capacity configurations are limited to three basic configurations as listed in the subparagraphs below. In the rare case that the listed configurations do not meet project requirements, more extensive project-specific editing will be required.

2.1.1.1 Elevator No.[_____] - Emergency Medical Service Accessibility (EMSA)

NOTE: Emergency Medical Service Accessibility (EMSA): For each building of two stories or greater, provide at least one elevator with a minimum size and arrangement to accommodate an ambulance stretcher 610 mm by 2134 mm, with not less than 127 mm radius corners, in the open, horizontal, position. For buildings with multiple elevators, an EMSA elevator must be accessible from all locations in the building; otherwise additional elevator(s) must also be EMSA.

Two size and capacity configurations of elevators will meet this requirement. For standard passenger applications use the 1588 kg capacity, single speed side slide described in this subparagraph. The larger elevator sized to accommodate pallet-size light freight loading described in next subparagraph below will also meet EMSA requirements.

Provide elevator(s) with minimum size and arrangement to accommodate an ambulance stretcher 610 mm by 2134 mm with not less than 127 mm with not less than 5-inch radius corners, in the open, horizontal position.

- a. Type: [Geared][Gearless]
- b. Rated load: 1588 kg [_____]
- c. Rated Speed: [60][105][150] m/min
- d. Car Door Type: Single-speed[side slide][center opening]
- e. Car Door Opening Width: 107 cm minimum, or [_____]

2.1.1.2 Elevator No.[_____] - Larger Capacity (Pallet-Sized) Loading

NOTE: Where a larger capacity elevator is required to accommodate light freight, typically pallet-size loading, use this subparagraph. Elevator must typically be 1814-2041 kg capacity (may be upwards of 2721 kg in rare instances), single speed center opening, 122 cm door opening width, and will typically be deeper than the 1588 kg EMSA elevator above.

This larger elevator will also meet the EMSA requirements described above.

- a. Type: [Geared][Gearless]
- b. Rated load: [1814][2041] kg [_____]
- c. Rated Speed: [60][105][150] m/min
- d. Car Door Type: Single-speed, center opening, horizontally sliding
- e. Car Door Opening Width: [122][137] cm

2.1.1.3 Elevator No.[_____] - Non-EMSA Elevator

NOTE: For smaller elevators where EMSA is not required (covered by one of the two elevator types above), this subparagraph may be used. Typical application would be an elevator bank where one elevator meets EMSA requirements. Elevator must be 1134 kg capacity, 107 cm door opening width, and either side slide or center opening, typically to

match other elevators in the bank.

This elevator will not meet EMSA requirements.

- a. Type: [Geared][Gearless]
- b. Rated load: 1134 kg
- c. Rated Speed: [60][105][150] m/min
- d. Car Door Type: Single speed[side slide][center opening],
horizontally sliding
- e. Car Door Opening Width: 107 cm minimum, or [_____]

2.1.2 Cab Enclosure and Hoistway Entrance Assemblies

NOTE: If retaining first 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 elevator cabs.

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

- a. Floor;[carpet][vinyl composition tile][vinyl sheet tile] [_____].
- b. Walls;[prefinished steel][laminated plastic] on plywood[stainless
steel] [_____]. Provide each cab wall with equally spaced and equally
sized wall panels. All wall panel fasteners must be concealed.

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

Accessories; Provide hand rails on full length of back wall and
side walls of elevator cab.

- c. Car doors, car door returns, and wall reveals;[prefinished steel
panels][stainless steel] [_____].
- d. Ceilings;[supported][prefinished steel panels][stainless steel][
anodized aluminum][egg crate] [_____].

Ceiling frame;[prefinished steel][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.

] 2.2.5 Automatic Operation

- a. Automatic Turn-Off of Car Light and Fan: Car illumination and fan are turned off automatically in case there is no hall call or car call in adjustable minutes during normal operation.
- b. Car call Cancellation: Allows cancellation of an incorrectly registered car call.
- c. Safe Drive Operation: When a car stops between floors due to malfunction, it will descend to the nearest floor at a low speed and

hold the doors open after checking all safety measures.

- d. Automatic voice function: Floor, direction, over occupancy, power failure, malfunction and fire must be automatically announced.
- e. Overload holding stop: When the number of passengers exceeds the normal capacity, a buzzer sounds and the elevator remains stopped at that floor. When the excessive number of passengers disembark, the buzzer stops, the elevator doors close, and operation continues.
- f. Anti-nuisance operation: In case of substantial difference between the number of calls registered on the car operating panel and actual load in the elevator, the elevator prevents unnecessary operation by canceling all registered calls when it arrives at the nearest floor.

2.2.6 Step-up or Down Transformer

UL listed, [UL 1561](#), general purpose, dry-type, self-cooled ventilated. Provide transformers in NEMA 1 enclosure. Transformer must have

220 degrees C insulation system for transformers 15 kVA and greater, and must have 180 degrees C insulation for transformers rated 10 kVA and less, with temperature rise not exceeding 150 degrees C under full-rated load in maximum ambient of 40 degrees C.[Transformer of 150 degrees C temperature rise must be capable of carrying continuously 100 percent of nameplate kVA without exceeding insulation rating.][Transformer of 115 degrees C temperature rise must be capable of carrying continuously 115 percent of nameplate kVA without exceeding insulation rating.][Transformers must be quiet type with maximum sound level at least 3 decibels less than NEMA standard level for transformer ratings indicated.] If main power transformer would be required due to elevators requiring different voltage, acrylic voltage signage (primary and secondary voltage with Elevator Number) must be provided and installed at visible side of main power transformer as large as possible.

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 12 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 152 mm W by 203 mm H by 32 mm D at FEO designated landing. Install at a height of 1,524 mm above the landing sill and directly above the FEO Phase I key switch. Provide box equipped with lock that uses the FEO K1 key.

2.3.3 Emergency Light Fixture

Upon interruption of normal power, emergency light fixture for passenger elevators must automatically and immediately illuminate and permit operation of the bell, subject to the activation of the emergency stop-switch or alarm button. Emergency power pack must be capable of providing a minimum of 1 hour emergency bell operation and 4 hours of continuous illumination.

2.3.4 Hoistway Access Operation

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

2.3.5 In-Car Inspection Operation

Provide In-Car Inspection Operation.

2.3.6 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.

2.3.7 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.

2.3.8 Elevator Emergency Power Operation

NOTE: Electrical design must 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 second 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.

2.3.9 Elevator Auxiliary Power Operating System

Provide elevator auxiliary power operating system for any elevator that is not included in the building emergency power operation. Auxiliary power operating system must, at a minimum, run the elevator to the next available landing, open the doors, and shut the elevator off at that landing.

[2.3.10 Hospital Emergency Commandeering Service (HECS)

NOTE: Only keep this HECS paragraph for hospital elevators or for projects in which this operation is specifically requested by the building owner or facility user.

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 doors will close and car will automatically return to normal service. Indicator lights must automatically illuminate during emergency service. Key must be removable only in "OFF" position.

]2.4 ELEVATOR DRIVE MACHINE, HOIST MOTOR, AND DRIVE MOTOR

Provide elevator drive machine, hoist motor, and motor drive system that is designed to be installed in an elevator machine room (MR) or an elevator machinery space. The elevator machine, motor, and drive configuration and installation design must be mechanically and electrically interchangeable with a minimum of two other elevator manufacturer's drive machines that are readily available in the elevator industry. Paint or finish ferrous surfaces with a minimum of one coat of manufacturer applied rust- inhibiting paint. Design the elevator drive system so that the hoist motor amperage does not exceed the motor data tag full load amperage in any operating condition, exclusive of acceleration and deceleration. Provide elevator hoist motor that is designed with Class F insulation and rated for 120 starts/hr. Design the elevator drive system to limit Total Harmonic Distortion to a maximum of 5 percent. No single harmonic may exceed 3 percent.

Provide an elevator drive machine designed for and provided with stranded steel wire rope for elevator suspension and counterbalance. The minimum acceptable diameter of suspension and counterweight ropes is 9.52 mm. Aramid fiber ropes, coated steel ropes, and non-circular coated steel belts must not be used for elevator suspension or counterbalance. The elevator drive machine must be equipped with machine manufacturer's designed and installed standard means for the manual release of the driving-machine brake.

2.4.1 Manufacturer's Factory Training and Technical Support

Provide an elevator drive machine from a manufacturer that provides comprehensive factory training and technical support for installation, adjustment, service, and maintenance of the drive system. The training and support 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 have been provided for a minimum period of 1 year prior to contract award date.

The elevator drive system must be identified as available for purchase and installation by any licensed elevator contractor. All drive system related components, parts, diagnostic tools, and software must be available for purchase, installation, and use by any licensed elevator contractor; "exchange-only" provisions for the purchase of spare parts are not acceptable.

2.4.2 Ascending Car Overspeed and Unintended Car Movement Protection

Provide elevator Ascending Car Overspeed and Unintended Car Movement Protection means that is designed to act directly upon, and apply a retarding force to, the elevator suspension ropes or rails. In addition to the requirements of ASME A17.1/CSA B44 or ROK ESMA, the means must be designed to detect and stop movement of the elevator suspension ropes that occurs as a result of loss of traction between the suspension ropes and the elevator machine drive sheave.

2.5 CONTROL EQUIPMENT

Enclose all elevator control equipment in factory-primed and baked-enamel coated sheet-metal cabinets with ventilation louvers, disconnect switch, ampere meter, power indicating lamp, and removable or hinged doors. Mount cabinets at a height of 254 mm above machine room or control room finish floor.

2.5.1 Motor Control Equipment

Provide variable voltage with silicon controlled rectifier (SCR) or Variable-Frequency Variable Voltage (VVVF) alternating current (ac) drive control.

2.5.1.1 Electrical Isolation Protection

Provide individual isolation transformers and individual choke reactors for each individual hoist motor. Provide filtering to maintain harmonic distortion below IEEE C62.41 standards as measured at the elevator machine room or control room disconnect.

2.5.2 Elevator Controller

For each individual elevator controller, and for each group controller, provide a microprocessor based controller. Provide controller(s) package that includes all hardware and software required for the installation, maintenance, testing, and service of the elevator, in its' entirety. Provide an elevator controller that is designed to automatically reestablish normal elevator operation following any temporary loss of power, regardless of duration. Remote Interaction Operation (RIO) must not be installed.

2.5.2.1 Elevator Controller Availability

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 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.

2.5.2.2 Elevator Controller Technical Support

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.

2.5.2.3 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 wide keyboard and a minimum 254 mm monitor. The elevator controller interface cabinet must comply with arc-flash protection requirements of NFPA 70E and UFC 3-560-01.

2.5.2.3.1 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 100 events or faults 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.

2.5.2.4 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.

2.6 OPERATING PANELS, SIGNAL FIXTURES, AND COMMUNICATIONS CABINETS

For all panels and fixtures, provide identical and uniform fixture design, material, finish, and components for all elevators. For all panels and fixtures, legibly and indelibly identify all buttons and all operating positions for each device. Use engraving and backfilling, or photo etching, for button and switch designations as well as elevator capacity and data, with name of elevator manufacture. 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 or LCD 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 diameter, satin-finish stainless steel, with illuminating LED or LCD halo.

2.6.2 Passenger Car-Operating Panel

Provide each car with two car operating panels that contain operation controls and communication devices for 1360 kg and above capacity; one car operating panel for the others. Provide exposed, flush mounted buttons for the controls identified in subparagraph PASSENGER 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 Passenger Controls

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

- a. LED 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.

**NOTE: Specify Key-operated on-off "HOSPITAL
EMERGENCY COMMANDEERING SERVICE" switch for Hospital**

only.

[f. Key-operated "HOSPITAL EMERGENCY COMMANDEERING SERVICE" switch.

12.6.2.2 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.
- 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 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. 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 LED or LCD 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 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 1 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 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.

2.6.9 Telephone and Communication Systems

Provide car emergency signaling devices that comply with ASME A17.1/CSA B44, paragraph 2.27.1 in its entirety, and additional requirements specified herein. The elevator emergency communication phone line must provide the capability for the elevator cab automated communication system to connect

to an emergency response desk that is manned 24 hours a day by authorized personnel. The phone line must provide the elevator cab communication system to automatically identify the location of the elevator, elevator number and provide the capability for voice communication between the elevator passenger and authorized personnel. The phone line must be capable to provide two-way voice communication between the elevator machine room/control room and the elevator cab.

2.6.9.1 Secondary Call Capability

The emergency communication line must provide the capability for the elevator cab communication device to accomplish the elevator safety code required secondary phone call in the event that the initial call is not answered within 45 seconds.

2.6.9.2 Video Display Capability

A means to display video to observe passengers at any location on the car floor, to authorized personnel for entrapment assessment, must be provided. The monitor/display can be located and viewed in the elevator machine room or at a manned 24 hour security desk. If Regional Dispatch Center (RDC) is utilized to answer emergency calls and infrastructure is available it is acceptable to be viewed at the RDC when calls are received.

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 PASSENGER ELEVATOR GUIDES, PLATFORM, AND ENCLOSURE

2.8.1 Roller Guides

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

2.8.2 Car Enclosure Wall Panels, Return Panels, Doors, Entrance Columns, and Transom

Provide 14 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. Return panels must be swing type.

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](#) or [ROK ESMA](#). 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 16 gauge minimum[prefinished steel][stainless steel] car doors of sandwich construction with flush surfaces on car and landing sides. 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.

2.8.5 Car Entrance Sill

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

2.8.6 Cab Finish Floor

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

2.8.7 Car Fan

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

2.8.8 Car Lighting

Utilize LED or LCD 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.

2.8.9 Car Protection Pads and Hooks

Provide fire retardant, hanging car protection pads that provide protection for all car interior wall panels. Provide permanently installed studs in car that are designed for hanging the car protection pads in the car.

2.9 PASSENGER 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. The door must have rear cover panel to lower opening noise for 91 mpm and above elevator system.

2.9.1 Hoistway Entrance Frames

Provide 14 gage minimum[prefinished carbon sheet steel][stainless steel] hoistway entrance frames. Solidly grout uprights of entrance ways to height of 1524 mm.

2.9.2 Hoistway Entrance Sills

Provide one-piece cast nickel silver, stainless steel, or white bronze

entrance sills. Set top of landing sill flush with top of finish floor. Solidly grout under full length of sill. Use same material for all hoistway and car entrance sills.

2.9.3 Hoistway Entrance Doors

Provide[hollow metal][stainless steel] non-vision construction hoistway entrance doors with flush surfaces on car and landing sides. Provide a minimum of two door guide assemblies per door panel, one guide at leading edge and one at trailing edge with guides in the sill groove the entire length of door travel. Use same material and finish for all hoistway and car entrance assemblies. Hall door locking device must confirm to ASME A17.1/CSA B44.

2.9.4 Hoistway Entrance Door Track Dust Covers

Provide sheet metal hoistway door track dust covers at each landing. Dust covers must cover top and hoistway side of door locks and door roller tracks, and extend the full width of the door track and associated hardware. Dust cover sections will not exceed 0.9 m in length.

2.10 HOISTWAY EQUIPMENT

2.10.1 Car and Counterweight Guide Rails and Fastenings

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

2.10.2 Pit Equipment and Support Channels

Provide rail-to-rail pit channels to serve as mounting surface for main guide rails and counterweight guide rails. In addition, pit channels will serve as mounting surfaces for car and counterweight buffers. Method of installation of channels, brackets and buffer mounts will 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. A secondary push-to-stop pit stop switch must be provided within the hoistway pit entrapment protection egress area, at a height between 1,270 mm and 1,524 mm above the pit floor.

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.

2.10.6 Compensation Chain

Plastic-coated chains must be provided to compensate for weight of hoisting ropes and unbalanced portion of traveling cables for elevators with more than 30 m of travel or manufacture installation standard. Compensation chains must be securely fastened to underside of car and counterweight frame with double loops, if chain should become taut for any

reason. A 100 mm minimum diameter, neoprene-covered roller with slotted brackets attached to counterweight rails must be provided and located in the bight of the chain. A contact must be provided on the assembly so that if the chain leaves its normal position, it will pull the roller out of its brackets, open the contact, and stop the elevator.

2.10.7 Floor Signage

Acrylic floor signage more than 170 mm H x 155 mm W must be provided and installed inside of hoistway.

2.10.8 Governor

Provide speed governor to operate car safety device. Governor must be complete with weighted pit tension sheave, governor release carrier, and mounting base with protected cable sleeves. Conform to ASME A17.1/CSA B44 or ROK ESMA. Governor for MRL elevator must be able to be tripped for testing from the outside of hoistway, and means must be furnished to prevent movement of the car when servicing the governor.

[2.10.9 POWER RE-GENERATING FED BACK SYSTEM

NOTE: Use the following paragraph if applicable to project.

For the purpose of saving energy, power re-generating fed back system must be applied to the use of gearless traction machines for 5-story or higher buildings. During the main motor power re-generating phase, the re-generated power must be fed to main power line. At this time the voltage and frequency must be the same as the main power supply.

] [2.10.10 SECURITY CAMERAS

NOTE: Use the following paragraph if applicable to project.

Provide elevator manufacturer's standard security camera, housing and mounting at the elevator cab ceiling. The security camera must conform to EIA 170 and EIA ANSI/EIA-330 specifications. All electronic components and circuits must be solid state. Elevator security camera wiring, power, conduit and connections are specified in Section 28 10 05 ELECTRONIC SECURITY SYSTEMS.

]PART 3 EXECUTION

3.1 INSTALLATION

Install elevators 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.

3.1.3 Machine Room / Control Room Plan Requirements

3.1.3.1 Location of Elevator Drive machine

Provide minimum clearance of 450 mm between any building component and a traction elevator drive machine.

3.1.3.2 Location of Governor

Provide minimum clearance of 254 mm between over-speed governor and any building component.

3.1.3.3 Entry Door

Provide minimum 914 mm W by 1,118 mm H entry door which has an out-swing, self-closing door with lever handle on side of the door equipped with a self-locking spring-type lock arranged to permit the door to be opened from inside the room without a key.

3.1.3.4 Access

Provide a permanent and unobstructed personnel and material access route from building entrance to the elevator machine room / control room door. The access route must have a continuous minimum width of 914 mm and minimum height of 2,133 mm.

3.1.3.5 Mechanical Equipment Installation

Do not locate HVAC equipment above elevator equipment. Drain AC condensate to a location outside of elevator machine room and hoistway.

3.1.4 Corrosion Protection

All ferrous metal elevator equipment and building components in the elevator hoistway, machine room, and machinery spaces must be painted with a minimum of one coat of rust inhibiting paint.

3.1.5 Hoistway Pit Entrapment Protection

Provide a minimum horizontal clearance of 508 mm between the side of the elevator platform/cab and any one wall of the elevator hoistway.

3.1.6 Hoistway and Pit Lighting

Install hoistway and pit lighting to provide a minimum of 10 fc at the pit floor in all areas of the pit. Hoistway lighting must include a minimum of two lighting fixtures for lighting of the elevator hoistway pit. The fixtures must have a one piece, molded, high-impact clear acrylic diffuser

with a secure seal against dust and moisture. A similar fixture must be provided at a minimum of every 3 meters vertically up the hoistway. The fixture at the top of the hoistway must be mounted on the ceiling. For control of the hoistway lighting circuit, provide two 3-way switches inside the elevator hoistway, at a height of 1.2 meters above the top and bottom elevator landings. Mount the switches on the hoistway wall, adjacent to the hoistway entrance strike jamb. The lower level lighting switch must be located adjacent to the hoistway pit access ladder.

3.1.7 Dedicated Branch Circuits

For each of the following circuits, provide a separate, dedicated branch circuit with a fused disconnect or breaker in the elevator machine room or control room. Disconnects and breakers must be lockable in the open position only.

- a. Elevator 120 VAC circuit for elevator cab lighting and receptacles
- b. Elevator cab HVAC equipment circuit (if provided)
- c. Elevator hoistway pit sump pump power and control system
- d. Elevator door controller (if provided)
- e. Pit & hoistway lighting
- f. MR, CR, or MS lighting
- g. Pit GFCI receptacles
- h. MR, CR, or MS GFCI receptacles
- i. MR or CR Heating and Cooling system

3.1.8 Elevator Hoistway Pit

3.1.8.1 Sump Pump Receptacles

Provide a separate branch circuit supplying power to the hoistway pit sump pump. Provide a dedicated simplex receptacle, to supply the permanently installed sump pump. Mount sump pump receptacle 1,524 mm above elevator pit floor. Provide LED or LCD indicator light to verify circuit is energized.

3.1.8.2 Hoistway Pit GFCI Receptacles

Provide a separate branch circuit supplying the hoistway pit receptacles with a minimum of two duplex GFCI receptacles in the pit. Locate one receptacle on each side wall of the hoistway, at 915 mm above pit floor.

3.1.8.3 NEMA 4 Electrical Enclosures

Provide NEMA Type 4 electrical enclosures per NEMA ICS6 for all electrical equipment located less than 1,219 mm above the pit floor. Electrical enclosures must be water-tight, dust-tight, and identified for use in wet locations in accordance with the requirements in NFPA 70.

3.1.9 General Wiring Requirements

Only electric wiring, raceways, and cables used directly in connection with the elevator are permitted inside the elevator machine room, control room, machinery space and Hoistway. All conductors and optical fibers except traveling cables must be in conduits. Allowable wiring includes wiring for elevator power control and operation, elevator communication, fire alarm and fire protection signals, lighting, receptacles, sump pump, and elevator machine room/control room/machinery space heating and cooling systems.

3.1.10 Counterweight Runby

Provide a minimum of 457 mm of counterweight runby to allow for rope stretch and adjustability.

3.2 FIELD QUALITY CONTROL

NOTE: Use QEI (Qualified Elevator Inspector) and
ASME A17.1/CSA B44 for elevator systems that comply
with U.S. standards. Use KoELSA Elevator Inspector
and ROK ESMA for elevator systems that complies with
local standards.

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

Upon completion, the[QEI][KoELSA Elevator Inspector] must provide written test data for all[ASME A17.1/CSA B44][ROK ESMA] 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][KoELSA Elevator Inspector] certification specified in Article FIELD QUALITY CONTROL. Reports must document phases of tests performed including initial test summary, repairs/adjustments made, and final test results.

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 and Army projects that are not managed by
NAVFAC FEAD.

NOTE: Use QEI (Qualified Elevator Inspector) and
ASME A17.1/CSA B44 for elevator systems that comply
with U.S. standards. Use KoELSA Elevator Inspector

**and ROK ESMA for elevator systems that complies with
local standards.**

[Contracting Officer will obtain services of Naval Facilities Engineering Systems 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 2 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][KoELSA Elevator Inspector]. The[QEI][KoELSA Elevator Inspector] 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][ROK ESMA], ASME A17.2, and contract documents. Upon completion of inspection and testing, the[QEI][KoELSA Elevator Inspector] must sign a copy of the completed forms and provide to the Contracting Officer. Within 2 weeks of the inspection, the[QEI][KoELSA Elevator Inspector] must also prepare a formal inspection report, including all test results and deficiencies. Upon successful completion of inspection and testing, the[QEI][KoELSA Elevator Inspector] will complete, sign, and provide a certificate of compliance with[ASME A17.1/CSA B44][ROK ESMA].

]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)][KoELSA Elevator Inspector].

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

Provide 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 megohm meter, volt meter and ammeter, infrared temperature gauge, door pressure gage, dynamometer, and 6 meter tape measure.

3.3.3 Field Tests

3.3.3.1 Endurance Tests

Test each elevator for a period of 1 hour continuous, automatic operation, with specified rated load in the elevator cab. During the 1 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 1 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 at each floor with no load in car, balanced 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 drive machine motor during 1-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 Balanced Load Test

Place balanced load in the elevator cab, according to the manufacturer's designed counterbalance. Perform electrical and mechanical balanced load tests of car and counterweight.

3.3.3.6 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.

3.3.3.7 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.

3.3.3.8 Sound and Acceleration 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.

Maximum noise level must be expected on the installation:

- (1) 55dB in the cab with the car running and doors closed at 1.2 meters above from finished floor.
- (2) 63 dB while the door is opening and closing at 1.2 meters above from finished floor.
- (3) 75 dB in the machine room 1 meter from Traction Machine and above 1.2 meters from finished floor.

Maximum acceleration criteria must be expected on the installation:

- (1) 0.3 m/s^2 in the moment of cab moving and stopping.
- (2) 0.25 m/s^2 in vertical acceleration of the cab with the car running.
- (3) 0.2 m/s^2 in horizontal acceleration of the cab with the car running.

-- End of Section --