

DIVISION 14 CONVEYING EQUIPMENT

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Unless stated otherwise, the standards in this Facilities Design Manual (FDM) are directed to the Design Professional to incorporate into the Project.

Although the Owner encourages improved concept, method and product recommendations by the Design Professional, deviation from these standards, including product requests for “approved equivalent” status, requires written justification from the Design Professional and written approval from the Owner’s Representative before completion of Design Development Documents.

Changes to this Division since the last issuance are indicated with yellow highlighted text.

Links to Support Documents, external webpages and other FDM sections are shown in underlined text.

14 20 00 ELEVATORS

A. GENERAL

1. To ensure specification and installation compliance with ISU Standards, use the services of an elevator consultant to provide design, specification, and construction/inspection services.
 - a. Hire Lerch, Bates & Associates Inc (<http://www.lerchbates.com/contact/OfficePage.aspx?officeid=20>), located in Minneapolis, Minnesota, or hire an elevator consultant having the following minimum qualifications.
 - 1) Minimum 5 years experience in elevator consulting field
 - 2) QEI (Qualified Elevator Inspector) certified
 - 3) At least 3 references of previous projects of similar scope and size submitted for Owner approval.
 - b. Coordinate predesign conference attended by Elevator consultant to determine basis of design.
2. Include the type, capacity, location and number of stops for each elevator in the Basis of Design.
3. Comply with standards in this Facilities Design Manual and the State Elevator Code (see subsection 02.04 in FDM Part 1/[Sec 02 Codes and Regulations.pdf](#)).
4. Specify single-speed center-opening doors wherever possible.
5. Specify for each building a minimum of 1 passenger elevator with a platform designed to carry a minimum 3500 pound load and meet requirements of Class C1 Industrial Truck Loading to permit occasional material transport or a person on a stretcher in normal horizontal position.
 - a. Specify cars are provided with removable pads to protect walls when moving equipment.
6. In addition to providing elevators designed to accommodate persons with disabilities (see subsection 02.07 in FDM Part 1/[Sec 02 Codes and Regulations.pdf](#)), specify the following features.
 - a. Car and corridor operating control buttons that project above the panel surface, not flush or recessed
 - b. A main car operating panel and, if needed, an auxiliary car operating panel to allow access from left, right and forward approaches by persons with disabilities in wheel chairs
 - c. A car leveling tolerance of plus-or-minus 1/4 inch regardless of load and direction of travel
7. See fire alarm information in paragraphs under Section 28 31 00 V in FDM Part 2/[Div 28 Electronic Safety And Security](#).

B. SPACE REQUIREMENTS

1. Elevators are required in buildings of more than 1 story.
2. In larger buildings, both freight and passenger elevators may be required.
3. Locate elevators to conveniently service penthouse and basement equipment rooms.
4. Locate sound insulation between elevator equipment and adjacent occupied space.
5. Design cars with durable, easy-to-clean floor finishes.
 - a. Discuss finish options with the Owner's Representative.
6. Where required by code, design elevator lobbies with fire rated construction at each floor and doors held open except when the fire detection system is in alarm.
7. Specify machine room ambient temperatures are between 65 and 90 degrees F for each machine room.
8. Specify an emergency light with power supplied by a battery pack or emergency power circuit in each machine room to assist service personnel in extricating people from elevator cars during a power failure.
9. Specify machine room and elevator pit floors have an oil- and solvent-resistant coating.
10. Within each hoist way at each floor, specify an **LED** light fixture with the following features.
 - a. Fixtures guarded to prevent damage
 - b. Fixtures controlled by switches located respectively in the pit and adjacent to the top floor opening

C. WARRANTY MAINTENANCE

1. Specify a letter indicating transfer of all component warranties to the Owner is furnished prior to Substantial Completion.
2. Specify required training of the Owner's personnel as follows.
 - a. Schedule training to overlap 2 work shifts.
 - b. Furnish instruction on proper use, operation and maintenance of equipment.
 - c. Furnish instruction on emergency access, operational failures and other related building emergencies.

D. OPERATING/MAINTENANCE MANUALS AND TOOLS

1. Maintenance Control Plan

- a. Specify the following documentation is furnished for use by the Owner.
 - 1) "As-built" elevator circuit wiring diagrams with location index and component function descriptions
 - a) One set laminated and located within the elevator machine room
 - b) One set submitted to Owner.
 - c) One set, electronic PDF format file(s), for viewing electronically and making additional prints
 - 2) One set labeled and tagged keys for all controlled features and switches
 - 3) Complete parts catalog, order forms and instructions for ordering spare parts
 - 4) Complete bound copies of warranties, approved submittals and test results
 - 5) Complete bound elevator operating instructions, including both car and lobby operating controls
 - 6) Complete bound maintenance and adjustment instructions, including tolerances to be maintained
 - 7) Complete bound manual of lubricating instructions, including recommended grade of lubricants
2. Specify required diagnostic tools and software used to maintain, adjust, and diagnose the operation of microprocessor controls are submitted to the Owner.

E. ELECTRIC TRACTION ELEVATORS

1. Specify solid state inverter type for AC drive unit elevators.
2. Specify drive unit sized at minimum 115% of design load.
3. Specify hoist cables with wedge type shackles.
4. Machine Room Less (MRL) Electric Traction Elevators
 - a. Determine the appropriateness of this application during Schematic Design before elevator system design begins.
 - b. Specify non-proprietary designed MRL elevators with machines from the following manufacturers.
 - 1) Hollister-Whitney (<http://www.hollisterwhitney.com>)
 - 2) Imperial Electric (http://www.imperialelectric.com/products/gearless_ac_machines.php)
 - 3) No substitution.
 - c. Machine shall not be located in top of shaft. All equipment shall be located in accessible equipment room.

F. HYDRAULIC ELEVATORS

1. Specify single-acting, under-the-car hydraulic plunger cylinder units with electric pump tank control system equipment located in the machine room.
 - a. Specify hydraulic power units designed and manufactured for elevator service and use PCB-free oil.
 - b. Provide heating and cooling as needed to maintain oil within operating temperature range recommended by the manufacturer.
 - c. Specify starters sized at a minimum of 115% of design load.

- d. Specify “soft start” motor starting circuits on motors over 20 horsepower.
- e. Specify the well hole drilled, soil removed and casing provided by the Contractor.
- f. Specify all pit openings to be sealed.
- g. Specify the following (formerly item F.5.c.):
 - 1) Shutoff valves located in the pit adjacent to each jack unit
 - 2) Code required pressure switch when cylinder head(s) is located above the oil reservoir.
 - 3) Any access ladders, platforms and cylinder stabilizing required
- 2. Valves
 - a. Specify temperature compensated hydraulic control valves from the following manufacturers.
 - 1) Bucher (<http://www.bucherhydraulics.com>) (for heavily used elevators)
 - 2) Maxton (<http://maxtonvalve.com>)
 - 3) No substitution.
- 3. Scavenger Pump
 - a. Specify that oil is automatically returned from the cylinder head to the hydraulic pump unit oil reservoir.
 - b. Specify pump by the following manufacturers.
 - 1) Wagner Scavenger Pump by Quintrel Corporation (<http://www.quintrel.com>)
 - 2) Approved equivalent
- 4. Do not specify flexible hydraulic hoses.
- 5. Holeless Hydraulic Elevators are not allowed.

G. ELEVATOR CARS

- 1. Passenger Elevators
 - a. Specify interior wall surfaces have removable raised panels of decorative color-core plastic laminate, solid surface material or stainless steel with pattern or texture that hides minor damage.
 - b. Specify #4 satin stainless steel finish for car doors, transoms, return panels and interior handrails.
 - c. Do not specify mirrored surfaces.
 - d. Specify LED lighting.
 - e. Specify exhaust fan units as appropriate to satisfy car size, environmental conditions, usage conditions and comply with code ventilation requirements.
 - 1) Specify units that can operate at high speed with a sound level less than 65 dbA measured 1 meter from the discharge center.
- 2. Freight Elevators and Service Elevators
 - a. Specify textured stainless steel or baked enamel steel for interior wall surfaces.
 - b. Locate two rows of interior wall bumpers.
 - c. Specify interior finishes that comply with the most restrictive flame spread and smoke generation code requirements.
 - d. Specify lighting as follows.
 - 1) LED fixtures mounted flush with the ceiling.
 - 2) Steel guards designed to support 150 pounds over the tops of light fixtures.
- 3. Car Top Control Station
 - a. Specify mount to provide safe access and utilization while standing in an upright position on car top.

14 28 00 ELEVATOR EQUIPMENT AND CONTROLS

A. EMERGENCY POWER OPERATION

1. Discuss emergency power and operational needs with the Owner's Representative.
 - a. Where emergency power operation is required, coordinate elevator requirements with emergency power system.
2. Specify the following equipment with battery backup or, where available, provide with emergency power.
 - a. Control module that positions car at the lowest level when in alarm
 - b. Car light operating at required code minimum
3. Coordinate work in this Division with Division 26 Electrical.

B. VOICE/DATA

1. Specify a dedicated multi-conductor traveling cable with minimum 4 shielded pairs, 20 AWG minimum.
2. Specify cable terminated on terminal blocks within the elevator controller and in an accessible junction box on the top of the elevator car.
3. Specify cable and/or terminal blocks at both ends are identified as conductors for future security cameras, card readers, etc.

C. DOOR EQUIPMENT

1. Passenger Elevators
 - a. Specify door operators and related equipment by the following manufacturers.
 - 1) GAL Manufacturing Corporation, Model MOVFR (<http://www.gal.com/content/products/doors/dooroperators/MOVFR/default.htm>)
 - 2) Moline Accessories Company (MAC) comparable closed-loop unit (<http://www.konespares.com/parts/mac-door-equipment.aspx>)
 - 3) No substitution.
 - b. Specify door re-opening devices by the following manufacturer.
 - 1) Adams Elevator Equipment Company, Model GateKeeper 2000 (<http://www.adamselevator.com/pdf/GateKeeper%20Product%20Selector%20Chart.pdf>)
 - 2) No substitution
 - c. Specify emergency hoistway access at each landing.
 - 1) GAL style drop key
 - 2) Keyhole sleeved completely through the door
 - d. Specify nudging operation as follows.
 - 1) After door control device beams are obstructed for a minimum of 20-25 seconds, a warning signal sounds and the doors attempt to close with a maximum force of 2.5 foot-pounds.
 - 2) Activation of the door-open button overrides the nudging operation and reopens the door.
2. Freight Elevators
 - a. Specify door operators and related equipment by the following manufacturers.
 - 1) Courion (<http://www.couriondoors.com/>)
 - 2) Peelle Company (<http://www.peelledoor.com/>)
 - 3) EMS Doors (<http://www.emsdoors.com>)
 - 4) No substitution.
 - b. Specify hatch doors with the following features.
 - 1) Powered by 2 door motors
 - 2) Automatically close after adjustable time period

- 3) Audible and visual warning emitted before doors start to close.
- c. Specify door reopening devices as follows.
 - 1) Beams project across the entire opening width for gate reversal.
- d. Locate an emergency hoistway access at each landing.

D. SIGNAL EQUIPMENT

1. Specify car and hall operating fixtures from the following manufacturers.
 - a. Adams Elevator Equipment Company, Survivor Plus (<http://www.adamselevator.com/pdf/p103.pdf>)
 - b. Innovation Industries Inc using vandal resistant PB-27 button (<http://innovationind.com/index.php?src=gendocs&ref=push-buttons2&category=Pushbuttons>)
 - c. PTL Equipment Company using vandal resistant Centurion button (<http://ptlequipment.com/web-content/CenturionPage.html>)
2. Specify car and hall fixture pushbuttons with the following features.
 - a. Round, vandal resistant
 - b. Illuminated with LED lamps when actuated
 - c. Project above the panel surface; not flush or recessed
3. Specify **allen head** fasteners on car and hall fixture faceplates.
4. Specify car position indicator fixtures as follows.
 - a. LED digital type with 2 inch high characters and direction arrows included
 - b. At least one fixture per elevator car interior
 - c. At least one corridor fixture per car, located at the main egress landing
5. Specify the main car operating panel **in a swing panel** with following features.
 - a. Two-position (Open/Run) keyed switch labeled "Door Hold"
 - 1) Switch in "Open" position will park elevator at landing with door open until keyed switch returned to "Run" position.
 - 2) Key removable in "Run" position only.
 - 3) Switch and hole size required for mounting furnished by the Owner and switch installed by the Contractor.
 - 4) Panel with mounting hole and wiring furnished and installed by the Contractor.
 - b. Locate a 120 volt GFCI outlet within the base below the panel.
 - c. Locate the following switches in the car operating panel locked service cabinet.
 - 1) Two-position stop switch marked "Run" and "Stop"
 - 2) Two-position inspection switch
 - 3) Two-position independent services switch
 - 4) Switches, labels, panel with mounting holes and wiring furnished and installed by the Contractor
 - d. Space for future 3/4 inch diameter floor-lockout key switches adjacent to floor pushbuttons
6. Specify mechanically attached main car operating sub-panels.
 - a. Specify adhesive attached sub-panels are not allowed.
7. Specify cylinder-switches for key-operated equipment furnished by the Owner and installed by the Contractor.
8. Telephone units
 - a. Specify vandal resistant, hands-free, two-way communication system with audible and visual components.

- b. Specify a speaker/microphone system mounted behind the grille pattern punched in the main car operating panel faceplate.
- c. Along with the adjacent tactile symbol, engraved sign and braille plate, locate and mount the "Push-to-Call" button integrally with the car operating panel faceplate.
- d. Unit shall be Wurtec S3 communicator line powered telephone.

E. KEYING AND ACCESS CONTROL

1. Elevator Keying Systems – all elevator keying is part of the ISU Medico master key system. For Department of Residence projects, confirm keying requirements with the Department of Residence.
 - a. Car Operating Panel (COP)
 - 1) For any floor with Access Control: Innovation Industries SERVA
 - 2) Stop key: Innovation Industries STOP
 - 3) Service Panel: Medico ISA
 - b. Intermediate Hall Station – Buzzer Reset shall be Medico ISI
 - c. Access Station – Fire Recall shall be FEO-K1.
 - d. Cab Access Hatch shall be Medico ISI. If in service panel this may be a toggle switch
2. Access Control – when using access control to provide secure access to floor/floors the following must be provided.
 - a. Control Operating Panel: Single gang device opening to hold full size card reader – Model TM110 TS Migration Reader from Identiv. Dimensions of device: 4.6 x 3.1 x 1.1 inches
 - b. Traveling Cable:
 - 1) 22-6 shielded wire to access control panels from COP connection.
 - 2) Cat 6 or 7 cable if security cameras are ever desired.
 - c. Elevator Machine Room: Will need wall space for access control panel. Will be one small panel for each elevator with access control. Panels will tie back to building primary access control center.

F. ELEVATOR CONTROLLER

1. Specify microprocessor control from the following manufacturers with consultation with the Owner's Representative.
 - a. Hydraulic, MRL and traction controllers by Elevator Controls Corporation (<http://www.elevatorcontrols.com/products/index.htm>)
 - b. Hydraulic, MRL and traction GALaxy Controllers by GAL Manufacturing Corporation (<http://www.gal.com/content/products/controllers/galaxy/default.htm>)
 - c. Hydraulic, MRL and traction controllers by Vertitron Midwest Inc (<http://www.vertitron.com>)
 - d. No substitution.
2. Specify the following features.
 - a. Capable of continuous operation in ambient temperatures between 65 degrees and 90 degrees F.
 - b. Software based and fully upgradeable and non-volatile.
 - c. Reprogrammable using on-board programmer and Owner's laptop computers.
 - 1) Provide hardware and software needed to interface Owner's laptop computers with the controller.
 - 2) Update hardware and software as needed to stay current with changing technology.
 - d. Provide diagnostics and logic to monitor safety circuits.
 - e. Specify control to include the following functions.
 - 1) Starting and stopping
 - 2) Automatically cutting power and bringing the car to rest on safety device activation
 - 3) Positioning the car at the appropriate level when in alarm. Discuss the appropriate level with the Owner's Representative.
 - 4) Preventing damage to the motor from overload or excess current

- 5) Requiring security features in a manner that does not interfere with emergency personnel
3. Mount in a vented cabinet in the machine room. **Cabinet shall have a light and outlet.**
4. Specify controller equipped with standard ports, interface ports, and drivers necessary to accept maintenance, data logging, fault-finding diagnostic, and monitoring using a built-in, on-board tool or the Owner's laptop computer.

G. HOISTWAY VENT DAMPER

1. Specify where required by code.
2. Design a vent opening using either a sidewall weather louver or a roof unit that will not allow rain or snow to enter.
 - a. Size the vent opening not less than 3.5% of the hoistway area, nor less than 3 square feet for each elevator car.
 - b. Do not provide a hatch lid or door.
3. Specify a well sealing damper normally held closed with a spring and with the following features.
 - a. A limit switch on the damper to indicate when the damper is fully open.
 - b. Specify power provided from a clearly marked dedicated circuit from the same power panel as the fire alarm circuit or from a circuit with emergency generator backup where available.
 - c. Specify damper operation as follows.
 - 1) The damper will open under any of the following conditions.
 - a) Activation of any lobby smoke detector that is associated with that specific elevator or bank of elevators.
 - b) Activation of the fire fighter key switch at the attack entrance.
 - 2) The damper will close when all for the following conditions are met.
 - a) All lobby smoke detectors associated with that elevator that went into alarm have been reset.
 - b) The fire fighter key switch at the attack entrance is turned off.
 - d. Specify a breaker lock on the circuit breaker.
4. To show when the damper is fully open, specify an indicator light with key switch on a single gang plate furnished by the Owner and installed and wired by the Contractor.
 - a. Specify mounting the key switch indicator light assembly adjacent to the fire alarm annunciator at the fire fighter's attack entrance.
 - b. For more information on the wiring schematic, sequence of operation and key switch indicator light assembly, see FDM Part 2/Support Docs for Div 28/Electronic Safety And Security Details/[Elevator Shaft Vent Control Details.pdf](#).

H. PIT WATER CONTROL

1. General
 - a. To prevent accumulation of water in the pit, specify a standard sump pump in a recessed sump.
 - b. From the sump pump, specify a 2 inch minimum diameter pipe that is fire-stopped at the pit wall and discharges to a sanitary drain.
 - c. Locate a 120 volt circuit and receptacle near the sump pit to provide power to the sump pump.
 - d. Consider specifying a high water float in the pit to send the elevator to mid-level and shut off.
 - e. **Specify an oil-discriminating sump pump system that will send an alarm when oil is detected.**

END OF DIVISION 14 CONVEYING EQUIPMENT