

## **DIVISION 14 - CONVEYING SYSTEMS**

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### **14 00 00. CONVEYING SYSTEMS**

#### **14 20 00. ELEVATORS**

.1 PLANNING CONFERENCE: The Associate shall arrange with the University Architect for a meeting to discuss elevator requirements with University personnel.

.2 USE OF EXISTING ELEVATORS: Refer to Division 01, paragraph 01 54 13.2. If University permission is granted to use existing elevators, the contractor should be alerted that elevators will be inspected by Facilities Operations and Development personnel before and after construction to appraise any damage caused by this use. The General Contractor shall be required to arrange and pay for maintenance during the period, and to restore interiors of cabs to original condition before the final project payment is authorized. Pending approval by the University Architect's Office, the Associate shall designate the appropriate elevator for use.

#### 14 20 01. GENERAL REQUIREMENTS:

.1 CONTRACT: Except as otherwise approved by the University, elevators shall be included in the general contract. Specify that all wiring installed by the elevator contractor shall comply with Division 26 of the specifications.

.2 PROVISIONS FOR SERVICING: The elevator manufacturer shall be required to provide evidence that a staffed service office is located within 50 miles of the installation and a warehouse of parts is maintained within 100 miles. Acceptable Columbus area companies will have a history of more than five years of continuous Columbus area elevator design, construction and maintenance experience. Maintenance and callback service shall be provided for one year from date of elevator acceptance. Include the following provisions in the specifications:

.2.1 MAINTENANCE BY MANUFACTURER: Furnish total maintenance servicing for a period of one year beginning on the date of University acceptance of elevator. Service shall include scheduled regular examinations of the equipment, during regular work hours by competent, trained employees of the manufacturer. The maintenance shall include necessary adjustments, greasing, oiling, cleaning, supplies, and parts to keep equipment in proper operation, except repairs made necessary by misuse, accidents, or negligence not caused by the manufacturer. Frequency of maintenance service will be established by the University Architect during the specification writing period, based on location and use of elevator. The contractor shall respond to all calls within forty-five (45) minutes after notification, including evening and weekends. Trapped passengers require immediate response and are to be treated at the highest emergency level. Failure to respond promptly or to provide competent service will be cause to hire another contractor to perform the work at the expense of the installing contractor.

.2.2 INSTRUCTIONS FOR MAINTENANCE PERSONNEL: The installer will furnish three copies of: final wiring diagrams, technical manuals and any diagnostic tools incidental to the installation. These items will become the sole property of The Ohio State University and are not subject to any manufacturer's restrictions. Repair parts catalogs, instruction manuals, and lubrication charts will also be furnished and updated periodically with new edition publications. Furnish required verbal and written instructions to designated University personnel to allow maintenance by

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14 20 01. GENERAL REQUIREMENTS: (Cont'd)

university staff, following commencement of the warranty period. Notice of inspection will be given to the Physical Facilities staff so that personnel of the University may be present.

.3 PERMITS: Elevator Contractor Company shall obtain and pay for all inspection for new and modernization permits.

14 20 02. REQUIREMENTS: Elevator Design and Installation shall comply with the current Ohio Elevator Code, Escalators Code and all referenced national codes.

.1 Provide a fixed metal ladder in each hoistway pit with a light switch, a separate GFI duplex outlet in addition to a dedicated non-GFI for the sump pump, and elevator stop switch inside the entrance area.

.2 Sump pumps, or drains in the pit are required. If a sump pump is installed on a hydraulic elevator, it must pump into an oil separator/collector sized for worst case scenario; check current version of OBC. Provide removable flush grate covers on sump pump holes.

.3 Provide hoistway vents for elevators serving more than three stories. Design with vents facing in a direction protected from the primary inclement weather conditions. Vent requirement shall be per the current Ohio code.

.4 Provide an ample equipment room with heating and cooling of elevator machinery spaces. Design a machine room with an air conditioning and/or heating unit to eliminate the effects of temperature and humidity on the electronic components. The elevator machine room temperature must be maintained between 60° and 90° Fahrenheit and 40% to 75% relative humidity. The air conditioner cannot be located directly over the elevator controller. There must be at least 7' headroom. A means to collect and drain condensation shall be provided. Drains cannot be hooked directly into sewers. Provide a safe way to service air conditioners in machine room. All exposed drives must be guarded. The Elevator Machine room ventilation equipment is a vital part of the elevator operation, it is therefore, required that the Elevator and Machine Room be connected to standby power or emergency generator, if available, for reliability.

.5 Only equipment required for elevator operation is permitted in elevator equipment spaces. No extraneous piping, ductwork, conduits, etc. will be permitted in elevator equipment spaces. Elevator machine room must be equipped with a light and duplex receptacle with GFI. It must be on a separate circuit from the control equipment.

.6 Provide proper separation between equipment room and hoistway. Provide fire rated enclosure for equipment room. Hydraulic elevator machine rooms should not be located next to classroom without sound deadening material.

.7 Provide a tank heater or viscosity control monitor for hydraulic elevator oil systems. Oil tank heaters shall be large enough to maintain freely flowing oil in the coldest seasonal conditions. Low oil control monitoring is also available.

.8 If not served by an emergency supply source, all hydraulic elevators should be designed with a feature to lower the elevator to the main landing in case of a power failure, generically called an Emergency Return Unit (ERU).

**14 20 00. ELEVATORS (Cont'd)**

14 20 02. REQUIREMENTS: (Cont'd)

- .9 Provide a well casing with a plugged bottom sleeved with scheduled 40 PVC or HDPE with an end cap for further protection for all hydraulic elevators, except holeless hydraulic elevators. In addition to the sleeved well casing, the cylinder shall be wrapped with Mylar tape or coated with asphaltic application.
- .10 Comply with fire detection/alarm system code. All elevator installations must have fire fighters service, Phase 1 and 2.
- .11 Provide signs for firefighters' operation at first floor and occupants signage at each floor with a etched graphic that says "Do not use elevator in case of fire" per elevator code.
- .12 Design the elevator main floor entrance with room for passengers to wait for the elevator out of the building traffic flow. If the Elevators open into Fire resistance rated corridor (egress path) there shall be a lobby that completely separates elevators from the corridor by fire barriers and opening protection. It shall be a violation to have Elevators situated in a common shaft enclosure with stairway.
- .13 Design temperature and humidity conditioned airflow in front of the elevator doors.
- .14 Design adequate space between the elevator and the outside to allow moisture and dirt walk-off prior to elevator entry.
- .15 Design at least one elevator in each building to serve the mechanical equipment floor(s) of the building.
- .16 In multiple elevator machine rooms every elevator must be assigned a different number. The number shall be securely attached or painted on:
1. The driving machine,
  2. The main line disconnect switch,
  3. The cross head and,
  4. On the Car operation Panel.
  5. Car Light Disconnect
  6. Car HVAC Equipment Disconnect

14 20 03. GENERAL DESIGN AND PLANNING:

- .1 All components of the elevator system shall be manufactured and installed by the elevator manufacturer or by firms regularly engaged in the manufacturer of elevator components.
- .2 PREFERRED TYPE: Traction type elevators are preferred. Hydraulic elevators may be used for two, three, and four stop elevators with normal heights and light traffic loads, up to 5000 lbs. Total elevator rise not to exceed fifty feet. Holeless type elevators are acceptable, but are not to exceed 20 feet. Type required for particular project will be determined at the planning conference. Wheelchair lifts and inclining stair lifts should be avoided in preference to a holeless hydraulic elevator.
- .3 PROVISIONS FOR ADDITIONAL ELEVATORS WITHIN THE CURRENT STRUCTURE: Where multiple elevators are planned and some units are for future installation, or are specified as an alternate, group units together that are included in the base contract, with no vacant spaces between units. Provide hoisting beam in base contract for all future or alternate elevators.

**14 20 00. ELEVATORS (Cont'd)**

14 20 03. GENERAL DESIGN AND PLANNING: (Cont'd)

.4 DESIGN FOR MAXIMUM EFFICIENCY:

.4.1 Arrange equipment to provide ample room for servicing and maintenance. Design hydraulic elevator mechanical room off a public area. The hydraulic mechanical room should not share a common wall with classrooms or offices. Design traction machine room to be accessible from a public corridor. The entrance should not be accessed through an office or restroom. Locate traction machines as follows:

.4.1.1 Basement Traction Machine: Applications with heavy loads both weight and traffic count, which require a low building profile and minimized elevator overhead heights.

.4.1.2 Overhead Traction Machine: Applications over four stops. Rise, speed, and heavy weight/traffic count, will dictate geared or gearless applications.

.4.2 Select equipment with regard to function and proper size to avoid excessive wear and provide long cable life. Locate hoisting machine and sheaves to avoid reverse bends in hoist cables.

.5 SPECIFICATIONS: Including the following:

.5.1 ACCESS TO OVERHEAD SHEAVES for the lubrication and servicing. Specify cable self-oilers for traction elevators.

.5.2 All rotating equipment must be mounted on isolation pads.

.5.3 INSTALL ELECTRIC FEEDER PROTECTION including line filters with elevator controls.

.5.4 EMERGENCY OPERATION - When specified, all elevators in a bank should be sequenced to return to the main lobby, park with doors open. The next car would do the same automatically until the last car is landed at the lobby. A secondary landing would be designated by the fire system in case of fire at the lobby level.

.5.5 SEPARATE ELECTRIC SERVICE TO CONTROL SYSTEM by fused disconnect. Elevator lights and accessories will be on a separate fused disconnect and readily available to inside the door of the mechanical room.

.5.6 HOOKS AND PROTECTIVE PADS: Provide pad hooks in all elevator cabs and one set of typical protective pads per project.

.5.7 On both new and remodeling installations, premium quality heavy duty door operators and track assemblies shall be specified to provide high performance operation.

TRACKS AND ROLLER GUIDES: All tracks shall be steel. All roller guides shall consist of three sound reducing wheels and shall be precision type ball bearing steel with Durabond polyurethane tires. Roller guides shall be held in contact with the rail by means of adjustable devices. Roller guides shall run on dry unlubricated guide rails. Car rollers shall be a minimum of six inches in diameter. Counterweight rollers shall be a minimum of three inches in diameter. Elevator car doors are to be

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14 20 03. GENERAL DESIGN AND PLANNING: (Cont'd)

protected by full door infrared reversal devices with multiple beams that cover at least every six inch area of the opening.

- .5.8 GUARDS FOR TOP OF CAR: Where there is more than 12" of space between the car and the hoistway wall a 42" car top guard rail will be installed.
- .5.9 STAINLESS STEEL CAR DOOR and frames.
- .5.10 CEILING PANELS: Various types will be required depending on location. Type required for any location will be determined during planning conferences.
- .5.11 CAR POSITION INDICATOR: Installed at Main lobby floor.
- .5.12 FACTORY FINISHED HALL DOORS AND FRAMES: Color shall be selected by the Associate and approved by the University Architect.
- .5.13 Flooring: Subfloor and flooring usually found in Division 09. Preference should be for sheet vinyl, second for vinyl tile, and third, for carpet.
- .5.14 TELEPHONE SYSTEM: Furnish a vandal proof telephone surface mount model HFF 1 Rd by Electronic Micro Systems or equivalent. Phone must be single button operation with ring down. No phone cabinets will be allowed. The phone button should not be hooked to the alarm bell. (The phone wire to the elevator machine room will be a part of the electrical contract). It is required that each car shall be equipped with an independent phone line.
  - .5.14.1 Conduit and wiring from the Elevator Controller to the telephone backboard will be installed by the Electrical Contractor.
  - .5.14.2 Final connections to be by the Elevator Contractor.
  - .5.14.3 The elevator contractor must provide at least two pair of shielded wires (one to be a spare) for phone operation inside the travel cord.
  - .5.14.4 Connect to the Campus telephone system for a fully functional system. Follow UNITS guidelines to make the final termination to the telephone backboard.
- .5.15 The following requirements shall be covered in The Elevator's Specifications:
  - .5.15.1 Interior car finishes (Walls, Handrails, Kick Plates, etc.)
  - .5.15.2 In Car Lighting (Normal and Emergency)
  - .5.15.3 Pit Lighting
  - .5.15.4 Machine Room Lighting
  - .5.15.5 Fixture Finishes (Stainless Steel, Vandal-Proof)
  - .5.15.6 Operating Panel Requirements
  - .5.15.7 Posting of Operating Certificate
  - .5.15.8 Emergency Battery Type
  - .5.15.9 Car Top Inspection Station
  - .5.16.10 Car Ventilation

**14 20 00. ELEVATORS (Cont'd)**

14 20 03. GENERAL DESIGN AND PLANNING: (Cont'd)

.6 OPERATION:

- .6.1 CONTROLS FOR PERSONS WITH DISABILITIES: refer to ADAAG for specifics.
- .6.2 INDEPENDENT KEY CONTROL: Where elevators require key control, locked cabinets are preferred to key switches. Security issues should be addressed thru programmable software. Cylinders for key operated devices shall be specified in the section entitled FINISH HARDWARE. Final keying will be determined by the University.
- .6.3 HYDRAULIC AND ELECTRIC TRACTION ELEVATORS. The controllers shall utilize microprocessor based logic with control parameters fully field adjustable. Programmable chips shall be permanently programmed and shall not be affected by the loss of power or by spikes in the power system. The controller shall control the motor speed throughout the acceleration and deceleration to provide good floor approach and consistent stopping accuracy within 1/4" (inch). Controller shall control the high speed of the motor such that the performance time for up and down direction shall be similar. The controller's design shall be capable of controlling existing AC motors and/or new AC motors to provide the required RPM for the specified speed of the elevator. Controller shall maximize the use of solid state devices for reliability. Controller shall also provide for motor overload and overcurrent protection. The controllers shall be non-proprietary. Controllers that require special diagnostic tools/devices are prohibited.
  - .6.3.1 SPECIAL REQUIREMENT:

Specify as SAFETY MEASURE FOR TRACTION ELEVATORS, to be part of controller package, a circuit designed to detect the failure of the brake to lift. Detection of this failure shall be by means of mechanical switch and shall take the elevator out of service at the next stop and shall remain out of service until the condition is rectified.
- .6.4 Design solid state devices (SCR Drive) to reduce harmonic distortion to an acceptable level as described below.
  - .6.4.1 SCR Drive shall limit the total harmonic distortion, especially (THD) reflected back into the power system at motor speed of 50 to 100 percent (%) of without substantial harmonic distortion anywhere in the system.
  - .6.4.2 Solid state devices or SCR Drive input voltage wave form or voltage distortion limits, shall be less than 3% THD.
  - .6.4.3 Wave form distortion of the fundamental cycle can come from many sources (i.e. rotating machines, etc.). Therefore, it is required that contractor measure reflected third harmonics (THD) after the start up of the system. Contractor shall provide all the necessary instruments or tools required to accomplish this measurement without any additional cost to the University. This measurement shall be done in the presence of OSU Representative(s) from the Department of Physical Facilities, (Elevator Maintenance/Fire Protection Shop).
- .6.5 ELECTRICAL MAGNETIC FIELD INTERFERENCE (EMF) SHIELDING:
  - .6.5.1 GENERAL: Whenever elevator machine rooms/control rooms are adjacent to sensitive electrical equipment rooms (i.e. computer centers/rooms, elevator electronic control rooms) it is required that adjacent walls, floors or ceilings shall be shielded per Section 16300 of this standard.

**14 20 00. ELEVATORS (Cont'd)**

**14 20 04. DESIGN FOR SPECIFIC INSTALLATIONS:**

- .1 ELEVATORS FOR PARKING RAMPS AND OTHER OPEN STRUCTURES: Elevators shall be designed in a sheltered area where rain and snow can not reach any of the entrances directly. The elevator design shall provide for a protected area in front of the elevator doors to shelter people waiting for the elevator in inclement weather. Outdoor seasonal elevators shall be designed to provide removable exterior doors that will protect the elevator entrances and shaft from the penetration of water and snow. Outside doors will also eliminate off-season vandalism and increase safety from falls into the elevator shaft. Exclusion from the elevator by fencing or other method is preferred. Elevator shall be provided with:
- .1.1 HEAT AND AIR CONDITIONING IN EQUIPMENT ROOMS to accommodate equipment. Provide heat and air conditioning to maintain 60 to 90 degrees Fahrenheit and 40% to 75% relative humidity. Provide electrical heaters in hoistways to prevent condensation in the limit switches and ice in the door tracks.
  - .1.2 HEAT IN ELEVATOR CAB to meet code requirements.
  - .1.3 AN EMERGENCY CALL BELL switch shall operate a bell in an occupied space. In some instance (i.e., parking ramp) a remote bell in another building may be required.
  - .1.4 GLASS OBSERVATION ELEVATORS must have emergency power to operate a fan. Battery back-up shall be provided to maintain a minimum of four hours of exhaust fan operation.
- .2 ELEVATORS FOR MULTI-STORY BUILDINGS: In buildings requiring the use of automatic elevators, provide at least one elevator sized for evacuating people and for delivering firemen and equipment to a fire:
- .2.1 The elevator shall be a minimum distance between walls, or between wall and door excluding return panels, not less than 80 inches by 54 inches with a 42 inch side slide door to accommodate wheelchairs or an ambulance stretcher in its horizontal position.
- .3 The associate shall notify the University's Project Manager by letter prior to submission of schematic design documents for any of the following elevator types:
- 1. Glass walled observation elevators
  - 2. Outside elevators
  - 3. Outside seasonal elevators
  - 4. Open air hoistways

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END OF DIVISION 14 – CONVEYING SYSTEMS