VERTICAL CIRCULATION

This Directive has been divided into two categories: new construction and renovation of existing. The requirements below are not inclusive of all Code requirements for an elevator, elevator shaft, or elevator machine room.


1. New Construction
   a. Design Considerations
      (1) Consultant shall provide analysis and recommendation for each different type of elevator equipment that is proposed and the supporting documentation for each choice:
         a) Electric elevator
         b) Hydraulic elevator
         c) Plunger elevator
         d) Single-belted elevator
         e) Double-belted elevator
         f) Traction elevator
         g) Holeless hydraulic
      (2) Include minimum capacities (References from Industrial Code Rule 8, NYS DOL Division of Safety & Health)
         a) §L8-1.4(b) The maximum number of persons permitted to be carried shall be based on 150 pounds per person.
         b) §L8-1.40(c) Carrying capacity.
         c) §L8-1.40(c)(1) The carrying capacity of elevators hereafter installed shall be not less than 75 pounds for each square foot of floor area inside of car.
      (3) Determination of number of elevators required:
         a) Consultant shall provide traffic analysis for new installations, describing floor area, population, acceptable interval, (i.e. the waiting time that will be tolerated by the population, for example,
30 seconds maximum wait time for an office environment) number of floors served, floor to floor heights(rise), etc. Consider the separation of passengers from service transport.

(b) These criteria determine what number of elevators will be required to adequately serve the building. The Fund shall review the criteria prior to a decision on the number of elevators required in the new construction.

(4) Describe criteria for determining where elevators should be placed
(a) §L8-1.3 Exit passageway.
(b) §L8-1.3(a) An unobstructed exit or passageway from an elevator to the outside of the building shall be provided at the lowest point of an elevator’s travel.

(5) Elevators shall serve all levels, including mechanical penthouses and cellars.

(6) Describe when LULA (Limited use/Limited Application) (ANSI A117.1) Lifts are preferred option.

(7) Consultant must certify the following: New construction of vertical transportation elements are in compliance with all requirements included in RS-3-3.2 12 NYCRR Part 8, Construction, Guarding, Equipment, Maintenance and Operation of Elevators, Dumbwaiters, Escalators, Hoists and Hoistways

(8) Soil Borings: Obtain soil borings as close to proposed elevator shaft as possible. Locate water level at or near proposed shaft.

(9) ADA Requirements: Refer to Fund Directive 1B-2.

(10) Independent Testing Agency: Owner shall hire an independent ASME Certified Elevator Inspector to perform field inspection and testing of elevator.

b. Additional Code Requirements for New Construction

(1) Seismic zone must be considered in design of cab rails and shafts.

(2) Prevention of Interior Fire Spread
(a) 771.1(c) Exits, including passageways, corridors and stairways, and elevator and dumbwaiter hoistways, escalators, shafts and other openings in floors, shall be enclosed or protected as set forth in section 771.4(h) of the NYS UFPBC.

(b) 771.4(h)(2)(i) Elevator and dumbwaiter hoistways and shafts, shall be constructed of noncombustible materials. All elevators and dumbwaiters shall be enclosed in a two (2) hour fire-rated enclosure.

(3) Requirements for Elevator Machine Rooms and Shafts

(a) Only elevator equipment shall be allowed in elevator machine room (ASME A17.1-101.2).

(b) The elevator machine room lighting shall be on a separate, dedicated circuit; and at least one 125v, single-phase duplex receptacle (GFCI) is required in the elevator machine room (NEC 620-23 and 620-85). Emergency lighting shall be provided in the elevator machine room; and the receptacle shall be on emergency power if building has a generator.

(c) Elevator machine rooms directly connected to the hoistway shall be enclosed by non-combustible construction having a fire-resistance rating of not less than that required for the hoistway enclosure (NYSUFPBC 771.4h(12)).

(d) Ventilate machine rooms to maintain the maximum room temperature required for equipment operation; supplement with mechanical cooling as required. Provide heating as required to maintain minimum temperature.

(e) In construction classification Type 2b, non-combustible, Referencing Table III in Part 704, fire-resistive rating of interior partitions enclosing hoistways and shafts, require a minimum ¾-hour rating as per footnote 6 of that table. However, there is an exception to this, Section 1062.3(a), which excludes elevators which do not pierce solid floors from complying with the ratings set-forth in Table III – 704. The Fund preference is for two-hour-rated enclosures for shafts and machine rooms.
(f) Section 1062.4 – Machine Rooms, states that “all elevator machinery shall be enclosed in a room or roof structure” and refers back to Section 771.4(h)(12) of the Code for applicable fire-resistance Ratings. That section states that “Elevator and power–dumbwaiter machine rooms directly connected to the hoistway shall be enclosed in walls of non-combustible material having a fire-resistance rating of not less than that required for the hoistway enclosure.”

(g) Section 771.4(h)(10) states that smoke vents are required for shafts exceeding 150 feet in height, penetrating two floors or more and not extending through the roof. Elevator shafts or hoistways shall be provided with smoke vents having an area of at least 3-½% of the hoistway area (NYSUPBC 771.4(h)(10)).

(h) In new construction, elevator shafts shall be provided with sprinklers at the top and bottom of the shaft. The sprinkler at the bottom of the shaft shall be sidewall-mounted sprinkler head and shall not be more than two (2) feet above the floor (NFPA 13, paragraph 4-13.5.1). The sprinkler at the top of the shaft shall be an upright or pendent sprinkler (NFPA 13, paragraph 4-13.5.3).

(i) ASME A17.1a-1997 Rule 102.2-c5 When sprinklers are installed in the hoistway, all electrical equipment, except earthquake protective devices conforming to the requirements of Rule 2409.1b(4), located less than 4 feet above the pit floor shall be: (a) weatherproof (NEMA4); and (b) wiring shall be identified for use in wet locations in accordance with the requirements in ANSI/NFPA 70.

(j) A means shall be provided to automatically disconnect power to the elevator prior to the application of water in the machine room or shaft. The use of smoke detection in these spaces to disconnect the main line power supply is prohibited. (ASME A17.1, 102.2(c)).
(k) In the case of fire and/or smoke, the sequence of events is as follows (Handbook on A17.1, 102.2):

(i) Smoke in the machine room or shaft will activate the smoke detector and initiate elevator recall to the designated level (generally the main/grade floor); and

(ii) As the intensity of the fire increases, power to the elevator will be disconnected and then the sprinkler will be activated. This safety code also describes three (3) methods for the activation of the sprinkler and disconnecting power. The easiest and most economical is rate-of-rise/fixed temperature heat detectors in the machine room and shaft to disconnect the power supply. These detectors would be located close to the sprinkler. The temperature ratings of the sprinklers and rate-of-rise/fixed temperature heat detectors would be such that the heat detector circuit would disconnect the power supply to the elevator(s) prior to the discharge of water from the sprinklers.

(l) Not more than four (4) elevators shall be installed in a multiple hoistway (NYSUFPBC 1062.3(c)).

(m) Only pipes and ducts for heating or fire protection of the hoistway shall be permitted in the hoistway. All other pipes, conduits and ducts shall not be installed in the hoistway (NYSUFPBC 1062.3(f) and ASME A17.1, 102.2). This requirement also applies to elevator machine rooms.

(n) Elevators having a travel of 25 feet or more shall have manually and automatically operated emergency controls which shall override normal operating controls and shall be suitable for use by local fire departments (ASME A17.1, 211.3).

(o) Fire Alarm Control System: Connect shaft smoke hatch, heat and smoke detectors to building fire alarm control system.

(p) A PVC type cylinder encasement shall be supplied. The PVC jacket shall create a means of environmental protection in the event of a hydraulic oil leak. The jacket shall be continuous and be pressure-tested prior to cylinder being placed into service.
The Engineer must account for construction tolerances between PVC jacket and steel casing. Replacement of steel casing may be required.

(4) Requirements for Elevator Pits

(a) Elevator pits shall have covered sump pits with gravity drains or sump pumps. These drains shall be connected to a sanitary sewer (ASME A17.1, 106.16); through an indirect waste connection which occurs outside of the elevator shaft.

(b) All elevator pits shall have ladders (ASME A17.1, 106.1.d).

(c) All elevator pits shall have lighting and a GFI power outlet (NEC 620-24).

(5) Requirements For Elevator Cabs

(a) Elevator cabs require ADA-compliant fire alarm visual devices. (NYSUPBFC 1100.1(e)

(b) All passenger elevators shall have emergency lighting (NYSUPBFC 1032.3b5).

(c) All passenger elevators shall have two-way voice communication and one-way public address communication (NYSUPBFC 1061.3(a)).

(d) Elevator cabs must be posted with maximum rated load capacities.

(e) Door detection shall be infra-red type, not electro-mechanical.

(6) Requirements for Elevator Recall

(a) Elevator recall control shall be via a Fire Alarm Control Panel, not via auxiliary contacts of smoke detectors. Wiring shall be supervised (NFPA 72, 3-9).

(b) Plans for hoistway must be submitted by the Consultant for approval – prior to construction and installation, to the Department of Labor per L8-1.10.
(c) Documents must call for testing and inspections as required by L8-1.11.

(7) Requirements for Automatic Lowering of Cab During Power Interruption

(a) Standard on all hydraulic elevators: Provide a 12-volt battery “rescue-vator” to bring the cab to the nearest floor and empty before shutting down.

(b) On traction-type installation: If there is not already an emergency source of power in the building, discuss with Campus to provide a source of power to operate the cycling of the doors and the lowering of the cab once the power has cut out.

(c) If there is an existing emergency power source, then a shunt and power unit can be installed which informs the elevator that it is now operating on emergency power and to go into the shut-down mode, empty the cab and go to the bottom floor and shut down.

2. Renovation of Existing Elevators

a. Consultant shall describe type of elevator and original manufacturer in preliminary program confirmation.

b. Code Deficiencies

(1) The Consultant designer/engineer is responsible to conduct a thorough examination of the existing elevator. A checklist is attached to aid this effort. All code deficiencies must be identified. In order for the elevators to be accepted—they must be refurbished top-to-bottom. The construction coordinators cannot selectively allow items to be repaired or addressed by the campus, and a C.O. cannot be issued to complete the work and close out the job without a fully compliant elevator.

(2) The existing elevators must be surveyed and an assessment made as to whether or not they are on an accessible route and whether they provide minimum access allowances for existing elevators per ANSI A117.1 1998.

(3) Include discussion of the special requirements of platform lifts.
(4) On an elevator rehab project – Consultant must confirm the fire rating of the existing construction, i.e. shaft walls and walls enclosing machine room.

(5) Include paragraph that cites code requirement for annual inspections and identifies the Fund’s requirement as described in paragraph 5b.

(6) Passenger elevators are required to be regularly inspected - every three months, and freight elevators shall be inspected - every 6 months, per NYS UFPBC Reference Standard RS-3-3.2 SubPart L8-1 paragraph 1.7. Inspection reports are required to be filed and maintained by the campus facility.

(7) If there is no evidence of these regular inspections of the existing equipment, it is incumbent upon the consultant to write a letter to the campus facility, bringing this to their attention, with a copy to SUCF.

(8) Determine if there are any issues of existing hydraulic elevators leaking oil. During design of elevator rehab, where hydraulic elevators are involved, consultant must confirm whether or not oil is leaking from the cylinder.

(9) A PVC type cylinder encasement shall be supplied. The PVC jacket shall create a means of environmental protection in the event of a hydraulic oil leak. The jacket shall be continuous and be pressure-tested prior to cylinder being placed into service. The Engineer must account for construction tolerances between PVC jacket and steel casing. Replacement of steel casing may be required.

(10) Clearing debris from an existing steel casing by means of vacuum has proven unsuccessful when ground water is encountered. The rapid change in water elevation has caused surround soils to migrate back into the steel casing.

(11) Drilling replacement casings shall be performed by experienced elevator casing drilling contractors, not water well drillers.

(12) Include requirements for review of existing machine rooms and identification of code deficiencies within existing machine rooms, i.e. ventilation requirements, smoke and fire detection, etc.
3. Requirements of Cab Refurbishment
   a. It has been found more economical to replace cab rather than rehab.
   b. Spring arm type door closure requires less maintenance than cable type and is preferred by the Fund. Get confirmation from campus representative that they are in agreement with this preference.
   c. ADA requirements
      (1) Hands-free intercom/telephone and handrails
      (2) Relocations of buttons/controls
      (3) Flooring and wall panels – weight, threshold and maintainability
      (4) Lighting

4. Fire Alarm Control System
   a. Integrate elevator shaft smoke hatch to building fire alarm control system.
   b. Connect smoke and heat detectors to building fire alarm control system.

5. Include requirements for service contracts and warranty provisions.
   a. In the specifications, the consultant must include information regarding the existing maintenance contracts being administered by the campus.
   b. Obtain a copy of the existing Campus Service Agreement and include the same provisions for the subject elevators for the full construction period plus one year beyond acceptance.
   c. The campus must delete the subject elevators from their existing service agreements beginning on the date of the executed construction contract.
   d. The Consultant shall review the need for diagnostic tools related to field service microprocessor documentation, and personnel training with the Campus.

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EXAMINATION OF EXISTING ELEVATORS CHECKLIST

1. System Description

The basic characteristics of the existing elevator system are as follows;

- Elevator type: 
- Capacity: 
- Speed: 
- Operation: 
- Control: 
- Machine: 
- Power Supply: 
- Floors Served: 
- Car & Hoistway Doors: 
- Door Equipment: 
- Clear Opening Door Size: 
- Self-Leveling: 
- Platform Interior Net Size: 
- Equipped for Disabled: 
- Equipped for Fireman’s Recall: 
- Equipped for 24-Hr communication: 
- Major Renovation: 
- Presently Maintained by: 
- Maintenance Overview: 
- Last Five Year Safety Test: 
- Manufactured/Installed: 
- Year Installed:

2. Evaluation of Existing Equipment & Recommendations

a. Machine Room Equipment

1. Controllers
2. Selectors
3. Hoist Machines
4. Motor Generators
5. Governors
6. Machine Room Lighting
7. Machine Room Ventilation
8. Disconnect Switches
9. Smoke Holes
10. Access Doors
11. Receptacles
12. Telephone
13. Sprinklered?
14. Any material suspected as ACM? Lead-Paint?

b. Hoistway Equipment

1. Hoist Ropes
2. Hoistway Limits
3. Top of Car Operating Station
4. Guide Shoes
5. Hoistway Wiring, Conduit and Travelling Cables
6. Car Door Operator
7. Hoistway Door Equipment
8. Floor Numbers
c. Pit & Pit Equipment

1. Light Switch
2. GFI power outlet
3. Pit Stop Switch
4. Ladder
5. Covered Sump Pit?

6. Drained or pump? If drained, plumbed to which system?
7. Sidewall-mounted sprinkler head at bottom of shaft as required?

d. Cab Enclosures

1. Cabs
2. Cab Flooring
3. Car Sills
4. Car Pushbutton Stations
5. Car Position Indicators

6. Door Protection
7. Traffic Director Station
8. Communication
9. Emergency Lighting
10. Ventilation

e. Elevator Lobbies

1. Hoistway Doors and Frames
2. Floor Markings
3. Hall Pushbutton Stations
4. Hall Position Indicators

5. Hall Lanterns
6. ACM or Lead-based paint present in ceiling/wall/doors/flooring?

3. Fire Emergency Service: Describe what has been provided. Is it functional and in compliance? Was there a recent upgrade to add fireman’s service recall? Confirm the presence and the function of smoke detectors.

4. Emergency power available for controlled lowering of cab and shutdown of elevator.

5. Budget Estimates For Recommendations