

## QA/QC Checklist

PENNSYLVANIA STATE UNIVERSITY



Construction Services

# DIVISION 14 – Conveying Equipment

## 14 20 00 – Elevators

General Information	Programming/Design	Bidding/Preconstruction	Installation/Construction	Closeout/Warranty
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### 01 General

1. PSU has approximately 400 elevators. L&I inspects them twice each year for safety issues. An independent 3 <sup>rd</sup> party firm inspects them twice each for maintenance issues. Jerry Huntingdon is PSU's assigned L&I elevator inspector.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Currently, elevators on campus must comply with ANSI 17.1 2000 with 2002 addenda.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Contact Mark Gates ( <a href="mailto:msg11@psu.edu">msg11@psu.edu</a> ; (814) 777-8762), OPP Elevator Systems Supervisor, when there is work done to an elevator, hoistway or machine room. Any work done in these areas will require an L&I permit that is SEPARATE from a building permit; Mark will work with L&I to obtain the permit.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. If a major renovation is planned for a building, it may be desirable to re-permit an existing elevator to function as a combination passenger/freight elevator. Freight cannot exceed ¼ of the rated elevator capacity. L&I will inspect for conformance during construction. Contact Mark Gates.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. After completion of construction work, L&I must inspect the elevator and will sign off on the permit prior to issuance of an occupancy permit. This inspection is separate from the L&I inspections for building occupancy.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6. Electrical receptacles installed in the machine room, pit, hoistway, or cars shall be GFCI protected.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7. When an elevator serves more than 4 floors above the egress level (generally, 5 floors in most cases), then at least one elevator in the building shall be on emergency power to be used as a means of egress.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

### 02 Elevator Car(s)

1. EACH elevator car shall be numbered inside and out. This number gets issued by L&I. Contact Mark Gates to coordinate/assign numbering.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. If modifications/renovations are made to the interior of the car, the car weight cannot be increased more than 5% of the current weight. This is especially noticeable when renovations include replacement of the car floor with a heavier material (stone, tile, etc). In addition, be advised that every five years, L&I conducts a full load safety test in each elevator. Cars are loaded to 125% rated capacity using 500lbs wheeled carts. When the safety test is conducted, the car floors are subjected to extreme point loads through the wheels of the carts. This has the capability of cracking or loosening ceramic, marble, or	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

terrazzo floor tiles.					
3. Materials used in the car interior (walls, ceiling, floor) must meet certain ASTM standards for Flame Spread and Smoke Development; this includes paint and glue for carpeting. See attached matrix. In addition, the subfloors in many existing elevators have a lot of “give” due to the age of the wood in the subfloor. Therefore, VCT is not always a good re-flooring solution. Johnsonite Roundell Rubberized tile ( <a href="http://www.johnsonite.com">http://www.johnsonite.com</a> ) is a good alternative solution to VCT that meets the required flame spread and smoke development requirements.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. Card readers used inside elevator cars shall interface with the fireman’s service so that the system can be bypassed. Once the fireman’s service key is turned at the elevator control panel, the card reader must be defeated.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5. The car control panel shall be at the required ADA height. The stop switch should be located 35” AFF.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. Key-operated floor cut-off switches shall be installed in the car’s operating panel.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7. Braille signage shall be located at 60” AFF on the door frame/buck. The car’s operating panel’s control buttons shall be identified w/ Braille letters/numbers.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8. “Do not use elevator in case of fire” signage shall be posted inside each car and at each landing.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9. Elevator call buttons at each floor landing shall be located at 42” AFF.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>03 Machine Room</b>					
1. There should be a minimum of 84” headroom clearance in the machine room.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. The machine room door shall be 2 –hour rated with self-closing and self-locking hardware and a ‘Group 2’ security lock; use OPP EL1 core.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3. Verify that there is no access via doors, panels, etc. to other areas through the machine room. This includes ceiling access panels to equipment.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. No conduit, piping, ducts, etc. serving other areas may pass through the machine room. A sprinkler pipe must terminate at the machine room’s sprinkler head.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5. A GFI receptacle shall be installed in the machine room.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. Identification tags shall be attached to all equipment; these tags must correspond to their respective elevator car that they serve.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7. A fused main disconnect or shut trip (if sprinklers are installed in the hoistway or machine room) shall be installed in the machine room.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8. A fused, 110V Normal/Emergency disconnect serving the car lights and the phone system shall be installed in the machine room.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9. 30” side clearance and 48” front clearance shall be maintained for electrical components.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10. Electrical components shall be properly labeled to indicate the panel number and breaker number that each component is served from.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
11. A smoke detector shall be installed in the machine room.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
12. The elevator phone consolidator and a phone shall be installed in the machine room.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Div 14 20 00 - Elevators					
Page 2 of 5					
05/21/2010 jlk29					

04 Hoistways/Shafts					
1. No screws or nails should protrude through the roof of the hoistway.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. There should be a minimum of 30" clearance at the top of the hoistway.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Ledges, recesses, or haunches in the wall of the hoistway that are wider than 4" shall be beveled at 75 deg to prevent toe-holds.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. A minimum 24" x 24" access panel/door to the elevator governor shall be provided. The access panel/door shall be secured with a 'Group 1' security lock; use OPP EL1 core.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5. Where there is a smoke relief damper at the top of a hoistway, a grating that can support a minimum of 300# shall be installed inside the hoistway below the damper. This is to prevent someone from falling down the hoistway if access is gained through the damper.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
05 Pit					
1. For elevators that travel more than 80", the pit ladder shall be a minimum 16" wide, be 7" off the wall (to the centerline of rung) and shall extend 48" above the first floor access to the pit; in other words, for a 48" deep pit, the ladder must be a minimum of 8' long.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. When sprinklers are installed in the shaft, or the building has fireman's service (basically, any time water can get in the shaft), or the elevator travel is longer than 80" (basically every elevator on campus), a sump pump with oil minder and audible alarm bell shall be installed in the pit. The oil minder alarm shall be installed in the machine room.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. A GFI receptacle shall be installed in each elevator pit.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. A light shall be installed in each elevator pit.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5. Conduit located 48" and below the pit floor that contains sprinklers in the hoistway shall be NEMA 4 weatherproof and suitable for wet locations.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. L&I mandated inspection tags shall be attached to all pit equipment (buffers, cables, etc).	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
06 Lighting Levels					
1. Lighting level in machine rooms is a minimum 19 foot candles.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. Lighting level in cars/cabs is a minimum 5 foot candles.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Emergency lighting level in cars/cabs is a minimum 0.2 foot candles with a 4 hour capability and an alarm bell.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. Lighting level at landings (inside door buck) is a minimum 10 foot candles.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5. Lighting level in shaft and pit is a minimum 10 foot candles at all corners.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
07 Sprinklers/Fire Alarm					
1. OPP prefers that sprinklers are not designed for the elevator machine room. Sprinklers in this area will require expensive shunt trips on the electrical equipment. IF a sprinkler is installed in the machine room, smoke and heat detectors must also be installed (within 2' of the sprinkler head). The smoke detector must recall the elevator and the heat detector must activate the shunt trip BEFORE water is applied to the elevator controls; the heat detector set point must be BELOW the sprinkler head set point.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Div 14 20 00 - Elevators					
Page 3 of 5			05/21/2010 jlk29		

2. ANY water lines passing through the elevator machine room must be enclosed in a bulkhead AND an L&I variance must be obtained.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Sprinkler lines in the elevator hoistway can only go up/down one floor. Sprinkler lines are not permitted to run the vertical length of the hoistway. The sprinkler line serving the pit may enter the hoistway at the first floor and go down to the pit. A sprinkler line serving the top of the hoistway may enter at the top floor and go up.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. On renovation projects, existing, stand-alone elevator fire alarm systems must interface with the building's fire alarm system. The fire alarm interface needs 4 TRI relays; elevator recall, alternate recall, flash in car (at control panel), and shunt trip shut down.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5. Heat and smoke detectors shall be located within 2' of a sprinkler head in the machine room or hoistway.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. If a sprinkler head is installed within 2' of the pit floor, no initiating device (smoke or heat detectors) is required in the pit.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7. A smoke detector shall be installed at each elevator landing within 10' of the hoistway/car door.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8. If the project does not call for sprinklers in the hoistway, then smoke detectors should not be installed in the hoistway either. Per National Fire Alarm Code (NFPA 72-2002) 6.15.3.6: Smoke detectors shall not be installed in unsprinklered elevator hoistways UNLESS they are installed to activate the elevator hoistway smoke relief equipment (smoke dampers and/or fans). This smoke detector MAY NOT initiate the elevator recall.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9. New fire alarm panels shall be Pyrotronics MXL type.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10. The fireman's recall key station shall be located at the nearest ADA building entrance/exit to grade. Contact Mark Gates to coordinate a location.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

## 08 Elevator Phones

1. EACH elevator car must have an emergency call-out phone that will be answered 24/7 by a live person.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. Phones in the elevator car must be a hands-free ADA-approved phone with visual lights.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Phones cannot be VOIP phones. EACH elevator car must utilize an analog line and the individual cars cannot communicate with each other.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. A lobby for shall be provided for EACH elevator car.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5. Lobby phones for the elevator shall be at the same level where a fireman would normally enter the building (generally ground level).	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. Lobby phones must be in sight of the corresponding elevator.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

FLAME SPREAD  
CAB PANELS -

ASTM SUMMARY SHEET FOR STANDARD BOSTOCK CAB INTERIORS		ASTM / Flame Class or UL	FLAME SPREAD	SMOKE DEVELOPED	TOXICITY
Fire-rated flakeboard (wall panels)		E-84 tunnel test C-236 Guarded Hot Box test; UL 723 Test for Surface Burning	20	25	
Fire-rated 3/4 inch flakeboard with Wilsonart standard plastic laminate attached to steel cab shell (flame directed at steel shell in test)		E-84	5	5	
Fire-rated 3/4 inch flakeboard with Wilsonart standard plastic laminate attached to steel cab shell, with PVC top trim piece (flame directed at panel front in test)		E-84-03	35	450	
Rigid vinyl (PVC) trim pieces		UL-94: V-0, 5VB			
Lightweight panels: 1/2" thick veneer core		E-84	25 or less	30-50	
Mahogany or cherry wood veneer panels - fire retardant finish		UL-723	< 22 (Class A or Class 1)	< 104 (Class A or Class 1)	None
Mahogany or cherry wood veneer panels - fire retardant core		UL-723	25	160	Not more than solid wood
Fire-rated plywood (.5 inch thick) (Island Downlight Ceiling)		E-84	25 or less	30-50	
Lighting fixture trim (Island Downlight Ceiling)		High temperature plastic		Below smoke emission criteria for elevator cabs	
Twin wall polycarbonate (translucent diffuser for Frame Ceiling)		E-84	10	180	

P A N E L S

C E I L I N G S

Class A Rating: Flame Spread of 0 to 25 / Smoke Development of 0 to 100.  
Class B Rating: Flame Spread of 0 to 75 / Smoke Development of 0 to 450.

Revised March 31, 2004

Bostock Company, Inc.