

**APPENDIX D – PREVENTIVE MAINTENANCE SPECIFICATIONS FOR HYDRAULIC ELEVATORS
(REVISED FEBRUARY 3, 2023)**

I. FULL-SERVICE WARRANTY MAINTENANCE REQUIREMENTS

- A. The Contractor shall examine, adjust, lubricate, clean, and when conditions warrant, repair or replace the following items and components thereof and all other mechanical or electrical equipment, including, but not limited to the following:
1. Entire hydraulic power unit including housing, pump, motor, valves, piping, pipe fittings/seals, muffler, belts, and fluid.
 2. The hydraulic cylinder head seals, packing and wiper rings. The entire piston assembly **excluding underground and buried hydraulic cylinder and piping**
 3. Shutoff and overspeed valve assemblies.
 4. Controller: All components including all relays, printed circuit boards, motor starters, solid state components, resistors, condensers, transformers, leads, electrical timing devices, computer devices.
 5. Car Positioning System: Encoder, tape, reader, and ancillary equipment.
 6. Hoistway door interlocks, hoistway door hangers, hanger rollers, up-thrust rollers, tracks, bottom door gibs, and closers.
 7. Hoistway limit switches, slowdown switches, leveling switches and associated cams and vanes.
 8. Car guide member assemblies complete.
 9. Door operators including motors, operator linkage, door infrared protective devices, car hangers, hanger rollers, tracks, car door contact, and clutch.
 10. Car top inspection stations.
 11. Traveling cables, and elevator control wiring in hoistway and machine room.
 12. Car buffers.
 13. Fixture contacts, push buttons, key switches and locks, lamps and sockets of button stations (car and hall), hall lanterns, position indicators (car and hall), direction indicators, solid state components and LEDs.
- B. The Contractor shall keep the guide rails free of rust. Renew guide shoe rollers as required to insure smooth and satisfactory operation.
- C. Contractor shall also examine and make necessary adjustment or repair to the following accessory equipment including re-lamping of signal equipment: hall stations, car stations, and direction indicators.
- D. Contractor shall be responsible for keeping the exterior of the elevator machinery and any other parts of the equipment subject to rust, painted with heat resistant enamel and presentable at all times. The machine windings shall be treated as needed, with proper insulating compound as recommended by the machine manufacturer.
- E. Correct any deficiencies found. Contractor shall be responsible for the correction of deficiencies.

APPENDIX D – PREVENTIVE MAINTENANCE SPECIFICATIONS FOR HYDRAULIC ELEVATORS
(REVISED FEBRUARY 3, 2023)

II. ITEMS OF PREVENTATIVE MAINTENANCE WORK

The preventive maintenance specified herein is considered the minimum for all equipment. If specific equipment covered by this Contract requires additional preventive maintenance for safe, reliable operation, as specified by the manufacturer, the Contractor shall perform the required additional preventive maintenance without added cost to the Authorized User.

Monthly Preventive Maintenance

1. Perform general inspection of hoisting machine, piping, and valves.
2. Inspect interior of cab. Test telephone or intercommunication system, normal and emergency lights, fan, emergency alarm, and check handrails/bumper rails for tightness. Make needed repairs.
3. Visually inspect controller. Verify cooling fan operation. Repair as necessary.
4. Ride car and observe operation of doors, leveling, reopening devices, pushbuttons, lights, etc.
5. Replace all burned out lamps in elevator cars, machine room, and pit.
6. Replace any defective LED indicators in car operating panel and hall fixtures.
7. Remove litter, dust, oil, etc. from the machine room.
8. Clean car sills.
9. Clean hoistway sills.
10. Check car and hoistway doors. Clean, adjust and lubricate door tracks, hangers, up-thrust eccentrics, and door relating linkages. Check door gib chassis for tightness and gibs for proper sill clearance.
11. Check door operation. Doors should open and close smoothly, quietly, and without slamming. Verify that door open speed is within installed specifications and door closing force does not exceed A17.1 code requirements. Inspect operator belt for wear and tension. Replace/adjust as necessary.
12. Check fire extinguisher for full charge. Report to Authorized User if charge is abnormal.
13. Perform general inspection of hydraulic power unit.
14. Check oil level in reservoir and empty drip pans.
15. Inspect and clean the car top.
16. Visually inspect controller, Verify cooling fan and/or air conditioning operation. Repair as necessary.
17. Observe operation of signal and dispatching system.
18. Check car and hall signal fixtures. Replace defective lamps/LED's.
19. Clean machine room of all debris.
20. Clean pits of all debris.
21. Check cylinder head packing, seals and wiper ring for excessive seepage and replace as required.
22. **Check across the line and wye/delta starter contacts, replace if excessive wear is present.**

Quarterly Preventive Maintenance

1. Perform Monthly Tasks.
2. Check condition of buffers.
3. Check leveling operation. Check floor magnets for proper positioning on landing system tape. Clean landing system tape, guides, and encoder rollers. Verify fastening of car top tape reader. Repair and/or adjust for proper leveling.
4. Check interlocks.
5. Clean light fixtures in cab.
6. Check adjustment of car guides members, lubricate and adjust, as necessary.
7. Clean car top ventilation fan and shroud.
8. Inspect traveling cables for wear and proper tracking.
9. Check controllers. Check all resistance tubes and grids. Inspect fuses and holders and all controller connections. Check printed circuit boards for overheating.
10. In hoistway examine guide rails, cams and fastenings. Inspect and test limit and terminal switches.
11. Clean bottom of platform, car tops and hoistway walls.
12. Check car frame and supports for bends or cracks. Examine car steadying plates and replace if rubber isolation is worn, cracked or crushed.

APPENDIX D – PREVENTIVE MAINTENANCE SPECIFICATIONS FOR HYDRAULIC ELEVATORS (REVISED FEBRUARY 3, 2023)

13. Perform condition survey and performance test. Provide the Authorized User with recorded results and recommendations.

Annual Preventive Maintenance

1. Perform **Monthly** Tasks.
2. Thoroughly clean car guide rails using a nonflammable or high flash point solvent to remove lint dust and excess lubricant. Vacuum down elevator shaft way.
3. Vacuum controllers inspect printed circuit board and other solid-state devices for cleanliness, condensation spots, evidence of heating and deterioration. Check controller wire terminals for tightness.
4. Perform all code mandated annual tests in the presence of a Qualified Elevator Inspector (QEI).

ONE-YEAR PRIOR TO CONTRACT EXPIRATION PREVENTIVE MAINTENANCE

- ~~1. Take a sample of hydraulic fluid and have tested by a certified third-party laboratory for viscosity, color, contamination, foaming, and other properties specified by equipment manufacturers. The laboratory results shall be reported to the FACILITY Plant Superintendent.~~
- ~~2. Drain, and replace hydraulic fluid, if it fails to meet the hydraulic fluid manufacturer's specified properties, or there is any evidence of accumulated condensation creating water contamination. The current standard hydraulic fluid is a multi-viscosity ISO 46 group II base oil hydraulic fluid suitable for a temperature range of -10 to +100 degrees Fahrenheit. If changing from another fluid type, drain the reservoir, and system, completely prior to refilling with the ISO 46 group II base oil hydraulic fluid.~~
1. Thoroughly clean the mechanism, pit, top, and bottom of car.

III. ELEVATOR INSPECTION AND TESTING SERVICE

As required by ASME A17.1, all elevators shall be appropriately inspected every six (6) months and tested annually. ~~Additionally, all roped hydraulic elevators shall be tested every five (5) years.~~ The tasks are detailed below and on the ASME A17.1 Checklists for Inspection of Hydraulic Elevators (Exhibit B). The Contractor must complete this checklist and submit to the Authorized User upon completion of each inspection service performed.

SEMI-ANNUAL INSPECTION SERVICE

1. Perform the required Semi-Annual inspection and testing service for each elevator.
2. The Contractor shall examine and test all safety devices, governors, oil buffers, etc. as required and outlined in the current adopted edition of ASME A17.1.
3. The Contractor shall notify the Authorized User of any noted deficiencies and furnish a test and condition report for each elevator to the Authorized User after the inspection using the Checklists for Inspection of Elevators (Exhibit B).

ANNUAL TESTING SERVICE – CAT-1 & CAT-5 (IF APPLICABLE)

1. The Contractor shall provide any needed equipment to perform the pretest examinations and tests at no additional cost to the Authorized User.
2. The Contractor shall provide all necessary weights and testing equipment, an adequate quantity of qualified journeyman elevator mechanics familiar with the equipment to perform tests and assist the inspector at no additional cost to the Authorized User.
3. The Contractor shall make formal safety tests and inspections as required and outlined in the current adopted edition of ASME A17.1.
4. These tests shall be conducted in the presence of an Authorized User-selected and qualified Independent Elevator Inspector. It is the Contractor's responsibility to ensure the presence of the Independent Elevator Inspector at the Annual and Five-year tests.
5. Tests performed on 1 and 5-year intervals will be scheduled to comply with the 1 and 5-year intervals specified in ASME A17.1 Appendix.

APPENDIX D – PREVENTIVE MAINTENANCE SPECIFICATIONS FOR HYDRAULIC ELEVATORS
(REVISED FEBRUARY 3, 2023)

6. The Contractor shall furnish test and condition reports to the Authorized User after each test using the Checklists for Inspection of Elevators (Exhibit B).
7. After tests have been performed, all load weighing devices, etc. shall be checked and adjusted as required to meet manufacturer's recommendations. ***Cars shall not be placed in service until all tests, checks and adjustments are completed and the elevators are in proper working condition.*** The Contractor will not be held responsible for any damage to the building and equipment (excluding elevator and related elevator equipment) caused by these tests unless such damage is a result of negligence by the Contractor.
8. Failure to follow correct procedures to prevent damages and failure to perform pretest examination shall be considered negligence by the Contractor.
9. The Contractor shall furnish and install, at no additional cost to the Authorized User, any missing code data plates as required by ASME A17.1. If necessary, the Authorized User will assist the Contractor in obtaining the data for the replacement code data plates.
10. If during the inspection/testing of a particular elevator, such elevator fails, Contractor shall continue the inspection/testing procedure with other elevators so as not to delay the overall inspection/testing process.
11. The Contractor shall provide a separate crew to repair deficiencies.

APPENDIX D – PREVENTIVE MAINTENANCE SPECIFICATIONS FOR HYDRAULIC ELEVATORS
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EXHIBIT A - SPARE PARTS LIST

- A. The Contractor shall maintain on-site, as a minimum, the following replacement parts:
1. Five (5) Fuses of each size, type, and current rating.
 2. Adequate supply of replacement lamps.
 3. Four (4) each type of car and hoistway door gibs.
 4. One (1) car and hoistway door hanger roller assembly.
 5. One (1) hoistway door interlock assembly, complete.
 6. One (1) plug-in relay for each type used.
 7. One (1) set of rollers for car guides
 8. One (1) Hoistway door closer spring and/or spirator.
 9. Hydraulic pump drive belts.
 10. Door operator drive belts.
 11. All required lubricants, cleaning agents, compounds and other materials and equipment required for preventive maintenance procedures specified herein.
 12. At the completion of the Mini-Bid Agreement, the above parts list is to be turned over to the Authorized User.
- B. The Contractor shall maintain at their local office, or have available within 24 hours of need, the following replacements parts:
1. Door operator motor
 2. Door clutch
 3. Printed circuit boards each type used, including power supplies
 4. Printed circuit boards for signal fixtures
 5. Transformers for each type and size used
 6. Motor Starter

**APPENDIX D – PREVENTIVE MAINTENANCE SPECIFICATIONS FOR HYDRAULIC ELEVATORS
(REVISED FEBRUARY 3, 2023)**

EXHIBIT B – CHECKLIST FOR INSPECTION OF ELEVATORS

CHECKLIST FOR INSPECTION OF HYDRAULIC ELEVATORS

GENERAL NOTES:

- (a) See ASME A17.2-2004 for detailed inspection information on each item number.
- (b) OK = meets requirements; NG = insert number to identify comment on back of this Checklist; NA = not applicable.

Address: _____

ID No: _____

Passenger Rated load: _____
 Freight class _____ Speed: _____

- Routine inspection and test
- Periodic inspection and test
- Acceptance inspection and test

Code Edition: _____

Inspected by: _____

Signature: _____ Date: _____

QEI No: _____ Certifying organization: _____

| | OK | NG | NA | | OK | NG | NA |
|--|--------------------------|--------------------------|--------------------------|---|--------------------------|--------------------------|--------------------------|
| 1 ELEVATOR — INSIDE OF CAR | | | | 2.36 | | | |
| 1.1 Door reopening device | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2.37 Pressure switch | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1.2 Stop switches | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2.38 Roped water hydraulic elevators | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1.3 Operating control devices | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2.39 Low oil protection | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1.4 Sills and car floor | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2.40 Inspection control | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1.5 Car lighting and receptacles | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2.41 Maintenance records | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1.6 Car emergency signal | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2.42 Static control | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1.7 Car door or gate | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3 ELEVATOR — TOP OF CAR | | | |
| 1.8 Door closing force | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3.1 Top-of-car stop switch | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1.9 Power closing of doors or gates | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3.2 Car top light and outlet | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1.10 Power opening of doors or gates | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3.3 Top-of-car operating device | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1.11 Car vision panels and glass car doors | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3.4 Top-of-car clearance, refuge space, and standard railing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1.12 Car enclosure | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3.5 Normal terminal stopping devices | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1.13 Emergency exit | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3.6 Final and emergency terminal stopping devices | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1.14 Ventilation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3.7 Car leveling and anticreep devices | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1.15 Signs and operating device symbols | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3.8 Top emergency exit | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1.16 Rated load, platform area, and data plate | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3.9 Floor and emergency identification numbering | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1.17 Standby power operation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3.10 Hoistway construction | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1.18 Restricted opening of car or hoistway doors | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3.11 Hoistway smoke control | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1.19 Car ride | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3.12 Pipes, wiring, and ducts | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2 ELEVATOR — MACHINE ROOM | | | | 3.13 Windows, projections, recesses, and setbacks | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.1 Access to machine space | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3.14 Hoistway clearances | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.2 Headroom | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3.15 Multiple hoistways | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.3 Lighting and receptacles | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3.16 Traveling cables and junction boxes | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.4 Machine space | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3.17 Door and gate equipment | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.5 Housekeeping | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3.18 Car frame and stiles | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.6 Ventilation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3.19 Guide rails fastenings and equipment | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.7 Fire extinguisher | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3.20 Governor rope | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.8 Pipes, wiring, and ducts | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3.21 Governor releasing carrier | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.9 Guarding of exposed auxiliary equipment | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3.22 Wire rope fastening and hitch plate | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.10 Numbering of elevators, machines, and disconnect switches | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3.23 Suspension rope | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.11 Disconnecting means and control | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3.27 Crosshead data plate and rope data tags | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.12 Controller wiring, fuses, grounding, etc. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3.28 Counterweight and counterweight buffer | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.13 Governor, overspeed switch, and seal | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3.29 Counterweight safeties | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.14 Code data plate | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3.30 Speed test | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.30 Hydraulic power unit | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3.31 Slack rope device — roped-hydraulic elevators installed under A17.1b-1989 and later editions | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.31 Relief valves | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3.32 Traveling sheave — roped-hydraulic elevators installed under A17.1b-1989 and later editions | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.32 Control valve | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | | | |
| 2.33 Tanks | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | | | |
| 2.34 Flexible hydraulic hose and fitting assemblies | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | | | |
| 2.35 Supply line and shutoff valve | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | | | |

