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**CONDUCT OF MAINTENANCE (P950)  
OPERATIONS AND MAINTENANCE MANUAL  
OPERATIONS & MAINTENANCE CRITERION**

**TITLE: ELEVATORS, DUMBWAITERS, AND LIFTS**

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## RECORD OF REVISIONS

Revision No.	Date	Description
0	12/17/98	Initial Issue
1	1/13/2006	<p>This revision includes:</p> <ul style="list-style-type: none"> <li>• The addition of a table of contents</li> <li>• Update references to DOE O 430.1B</li> <li>• Update references to DOE O 433.1</li> <li>• Updated elevator code references throughout document</li> <li>• Updated definitions to be consistent with ASME A17.1 and ASME A18.1</li> <li>• Updated references to FMD and FM-MSE</li> <li>• Included information on specific periodic testing and inspection intervals as Attachment A</li> <li>• Expanded references of ASME A17.1 and A18.1 to show some specific requirements</li> <li>• Clarified applicability of current version of Code over previous versions</li> <li>• Clarified roles of the AHJ</li> <li>• Removed elevator listings from the document and left as separate reference available through the AHJ</li> <li>• Added section on maintenance records requirements from A17.1</li> <li>• Added section on operations requirements for trapped personnel in an elevator.</li> </ul>
2	3/9/2010	Updated format per requirements of P-311. Updated requirements to match current versions of AMSE A17.1, A17.2, A17.4, and B18.1. Updated elevator evacuations to reflect current organization and relationship with the LA County Fire Department. Added paragraph referencing Operability Determination and Functional Assessment.



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## CRITERION 602

### ELEVATORS, DUMBWAITERS, AND LIFTS

#### 1.0 PURPOSE

The purpose of this Criterion is to establish the minimum requirements and best practices for operation and maintenance of elevators, dumbwaiters, and lifts at LANL.

This document addresses the requirements of P 315, *Conduct of Operations Manual*, and P 950, *Conduct of Maintenance*, by defining the minimum operations and maintenance criteria for structures, systems, and components that it covers. The criterion lists requirements that are based on codes, standards, contract commitments, lessons learned, or business case. It also lists recommendations based on industry practices, operational experience, or business case. Guidance for implementation of the requirements and recommendations is also provided.

#### 2.0 SCOPE

The scope of this Criterion includes the routine inspection, testing and preventive and predictive maintenance of elevators, dumbwaiters, and lifts. This Criterion does not address actions required for alteration, repair or replacement of equipment.

#### 3.0 ACRONYMS AND DEFINITIONS

##### 3.1 Acronyms

AHJ	Authority Having Jurisdiction
ASME	American Society of Mechanical Engineers
CFR	Code of Federal Regulations
DOE	Department of Energy
MM	Maintenance Manager
O&M	Operations and Maintenance
SSC	Structures, Systems, and Components

##### 3.2 Definitions

**ASME Code.** The American Society of Mechanical Engineers Safety Code for Elevators and Escalators establishes Recommended Rules for the Care and Operation and also the Rules of Safety governing the Design, Fabrication and Inspection of Elevators, Dumbwaiters and Lifts. See References section for ASME codes used in developing this document.

**Capacity.** The load that the equipment is designed and installed to lift at rated speed (also known as rated load). (ASME 17.1)

**Corrective Maintenance.** The repair of defective, failed, or malfunctioning units, or equipment to restore their intended function, or design condition. This form of maintenance does not result in a significant extension of a unit's expected useful life. (DOE Order 430.1b)

**Dumbwaiter.** A hoisting and lowering mechanism with a car of limited size which moves in guide rails and serves two or more landings that is used exclusively for carrying materials. (ASME 17.1)

**Elevator.** A hoisting and lowering mechanism, equipped with a car that moves within guides and serves two or more landings and is classified for freight or personnel per ASME A17.1

**Formally Removed From Active Service.** Unused units de-energized, modified as required by code for "Installation Placed Out of Service" (ASME 171.1, Section 8.11.1.4), locked and tagged out of service with permanent "Out of Service" signs installed at each access point, and removed from the active list.

**Frequent Use.** The continuous, daily, or weekly use of a unit within its design parameters.

**Management Level Determination (ML1, ML2, ML3, ML4)-** ML designation is used to grade the structures, systems, equipment, and components and associated activities based on their importance to the protection of the public, environment, and workers, security, and the Laboratory mission. See AP 341-502 for definitions of each ML level.

**Material Lift.** A hoisting and lowering mechanism normally classified as an elevator, equipped with a car which moves within a guide system installed at an angle of greater than 70 deg from the horizontal, serving two or more landings for the purpose of transporting materials which are manually or automatically loaded or unloaded. (ASME 17.1)

**Platform Lift.** A hoisting and lowering mechanism intended for the transportation of a mobility impaired person only. The device shall have a limited vertical travel, operating speed, and platform area. Operation shall be under continuous control of the user/attendant. The device shall not penetrate more than one floor. A full passenger enclosure on the platform shall be prohibited. (ASME 18.1)

**Preventive Maintenance.** All systematically planned and scheduled actions performed for the purpose of preventing failure. (DOE Order 430.1b)

**Sensitive Material.** Items whose consequences of damage or destruction could lead to severe ramifications far beyond the damage, or loss of the specific item itself.

**Unit.** In the context of this criterion, a unit refers to an elevator, dumbwaiter, or lift.

	<p style="text-align: center;"><i>Conduct of Maintenance (P 950)</i>  Operations and Maintenance Manual  Elevators, Dumbwaiters, and Lifts</p>	<p style="text-align: center;">Criterion 602 R2  Page 6 of 15</p>
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## **4.0 RESPONSIBILITIES**

### **4.1 MSS-Division Leader**

Receives and approves or rejects, in conjunction with the AHJ, requests for variances from this criterion. Maintains the record of decision for all variance requests.

### **4.2 MSS- Maintenance Programs (MP)**

Responsible for the technical content, monitoring the applicability and the implementation status of this Criterion. MSS-MP will assist organizations that are not applying or meeting implementation expectations or will elevate concerns to the appropriate level of LANL management.

MSS-MP shall maintain a list of the code in force for each elevator, dumbwaiter and lift.

### **4.3 Facility Operations Director (FOD)**

Responsible for implementation of this O&M Criterion for identified systems/equipment within their facility boundaries.

### **4.4 Operations Manager (OM)**

Responsible to the FOD for implementing operation portions of this Criterion and for coordinating transfer of systems/equipment to the Maintenance Manager for maintenance activities. The OM with concurrence of the FOD will prioritize implementation within budget allocations.

### **4.5 Maintenance Manager (MM)**

Responsible to the FOD and the MSS-Division Leader for implementing the maintenance portions of this Criterion and for coordinating the transfer of systems/equipment to the Operations Manager at the conclusion of maintenance activities. The MM with concurrence of the FOD will prioritize implementation within budget allocations.

### **4.6 Los Alamos County Fire Department**

Responsible for performing all evacuations of personnel trapped in elevators.

### **4.7 Authority Having Jurisdiction (AHJ)**

The AHJ (Point of Contact for the Mechanical Chapter of the LANL Engineering Manual) is responsible for providing a decision on specific technical questions regarding the systems or equipment relevant to this criterion.

The AHJ is responsible for reviewing and concurring with the requirements of this criterion where required by ASME A17.1.

## 5.0 PRECAUTIONS AND LIMITATIONS

### 5.1 Precautions

This section is not intended to identify all applicable precautions necessary for implementation of this Criterion. However, all applicable precautions should be contained in the implementing procedure(s) or work control authorization documents. The following precautions are intended only to assist the author of a procedure or work control document in the identification of hazards and precautions that may not be immediately obvious.

### 5.2 Limitations

The intent of this Criterion is to identify the minimum requirements and recommendations for SSC operation and maintenance across the Laboratory. Each user is responsible for the identification and implementation of additional facility specific requirements and recommendations based on their authorization basis and unique equipment and conditions, (e.g., equipment history, manufacturer warranties, operating environment, vendor O&M requirements and guidance, etc.).

Nuclear facilities and moderate to high hazard non-nuclear facilities will typically have additional facility-specific requirements beyond those presented in this Criterion. Nuclear facilities should implement the requirements of DOE Order 433.1A as the minimum programmatic requirements for a maintenance program. Additional requirements and recommendations for SSC operation and maintenance may be necessary to fully comply with the current DOE Order or the Code of Federal Regulations (CFR) as applicable.

Nuclear facilities, certain high hazard facilities and explosives facilities may have additional facility specific requirements beyond those presented in this Criterion which are contained in the Documented Safety Analysis (DSA), Technical Safety Requirements (TSR), or facility safety plans, as applicable.

The regulations that govern inspection, repairs, and maintenance may be different depending on when a unit was installed. This Criterion, therefore, cannot cite each requirement. The owner, or owner's designee, must become familiar with the provisions of the referenced regulations that apply to each specific unit under his/her jurisdiction. MSS-MP can provide assistance with this effort.

## 6.0 REQUIREMENTS

Minimum requirements for all users are specified in this section. Requested variances to these requirements shall be prepared and submitted to MSS-MP for review and approval. The MSS Division Leader approves or denies variances. The Criterion users are responsible for analysis of operational performance and SSC replacement or

refurbishment based on this analysis. Laws, codes, contractual requirements, engineering judgment, safety matters, and operations and maintenance experience drive the requirements contained in this section.

Note: Discovery of SSC with a degraded or non-conforming condition is a triggering input to the Operability Determination and Functional Assessment process defined in AP-341-516. Degraded or non-conforming conditions include, but are not limited to, failed equipment or components, unsatisfactory readings, code or standard violations and fire protection impairments. Personnel performing tests or inspections under this O&M Criterion are not responsible nor authorized to perform the Operability Determination. Any degraded or non-conforming condition discovered under this O&M Criterion shall be communicated to the FOD Designee for input to the AP-341-516 process. While that process may not apply in Low Hazard Non-Nuclear and Office facilities, the same concept applies. The FOD organization is responsible to determine the response (taking equipment out of service, establishing fire watches, limiting operations, etc.) to SSC degraded and non-conforming conditions.

## **6.1 Operations Requirements**

### **6.1.1 Elevators, dumbwaiters and material lifts**

Operation, inspection, testing, maintenance, and repair of elevators, dumbwaiters and material lifts shall conform to the requirements of the current revision of ASME A17.1 for the following sections:

- Section 5.10 - Elevators Used for Construction
- Section 8.1 - Security
- Section 8.6 - Maintenance, Repair, and Replacement
- Section 8.7 - Alterations
- Section 8.9 - Code Data Plate
- Section 8.10 - Acceptance Inspections and Tests
- Section 8.11 - Periodic Inspections and Tests

For other sections, use the applicable section of the Code at the time of installation or the Code effective as applicable to and for each alteration. For all alterations, the applicable section of the Code effective at the date of each alteration applies. MSS-MP shall maintain a list of the applicable codes in force for each elevator and dumbwaiter.

### **6.1.2 Platform lifts**

Operation, inspection, testing, maintenance, alteration and repair of platform lifts shall conform to the requirements of the current revision of ASME A18.1

### **6.1.3 Evacuation of Trapped Passengers**

In the event passengers become trapped in an elevator, to assure the safety of the passengers and the personnel performing the evacuation, only trained and qualified personnel shall perform the evacuation following the guidance in ASME A17.4.

- Elevators with phones shall have a sign instructing passengers to call 911.
- Elevators with a call button shall have the call button programmed to call 911.
- The 911 operators will contact the Los Alamos Fire Department for all trapped passenger calls.
- Fire Department personnel trained in elevator rescue will perform all passenger evacuations.
- The Fire Department Dispatcher will contact the elevator maintenance crew for support. During normal working hours the elevator maintenance crew will report to the scene to support the Fire Department.
- Fire Department personnel will open the elevator disconnect switch prior to starting the evacuation process.
- On hydraulic units, Fire Department personnel will close the main hydraulic shutoff valve prior to starting evacuation operations.
- The Fire Department will maintain control of the elevator during the evacuation process. Upon completion of the evacuation, the Fire Department will turn control of the elevator over to the FOD Designee.
- The FOD Designee will take the elevator out of service, until a qualified technician examines the equipment, makes repairs as necessary, and deems it safe to return to service.

#### **6.1.4 Access Control and Keys**

Control of access to keys and equipment is required to be restricted per ASME 17.1, Section 8.1. This includes maintaining custody of keys for access to groups as follows:

Group 1 - Restricted to Elevator Personnel Only (trained in proper elevator maintenance and operations procedures)

Group 2 - Authorized Personnel Only

Group 3 - Emergency Operations Personnel Only

#### **6.1.5 Data Plates**

A Code Data Plate is required for elevators, dumbwaiters and material lifts (but not platform lifts) listing the Code to be used for inspections and tests per ASME 17.1, Section 8.9. This plate shall be in plain view, securely attached to the main line disconnect or on the controller. The plate shall be of material and construction that letters and figures stamped, etched, cast or otherwise applied to the face shall remain permanently and readily legible.

### **6.2 Maintenance Requirements**

#### **6.2.1 Inspections**

Inspections are required at intervals at least as frequent as those defined in Appendix A – Periodic Inspection and Testing Intervals. Inspections are also required for initial acceptance following unit installation or alteration.

These inspections are performed by a person authorized by MSS-MP and with the certification as an inspector per the current revision of ASME QEI-1. The inspections will be performed in accordance with the requirements of the applicable revision of the Codes ASME A17.1 and A18.1 and the guidance of the current revision of ASME A17.2.

In case of a failed inspection, Appendix B must be turned in to the FOD Designee within 1 hour of completion of the inspection. This serves as the input to the Operability Determination and Functional Assessment process discussed above. A copy of Appendix B with the FOD Representative signature will be turned in to MSS-MP at the end of the shift.

#### **6.2.2 Periodic Tests**

Periodic testing is required at intervals at least as frequent as those defined in Appendix A – Periodic Inspection and Testing Intervals. This testing is conducted by personnel qualified to perform such service and in the presence of a person authorized by MSS-MP and with the certification as an inspector per the current revision of ASME QEI-1.

#### **6.2.3 Preventive Maintenance**

A Preventive Maintenance program that augments the Periodic Inspection and Testing listed above shall be in place to ensure cleaning, lubricating and adjusting applicable components at least annually and at more frequent regular intervals based on equipment age, condition, and accumulated wear as well as the design, usage and environmental conditions of the equipment. This Preventive Maintenance program shall be conducted by personnel qualified to perform such service.

#### **6.2.4 Firefighters' Emergency Operation**

All elevators provided with firefighters' emergency operation shall be subjected monthly to Phase I recall by use of the key switch, and a minimum of one-floor operation on Phase II as described in ASME 17.2, Section 8.6.10. A record of findings shall be available to elevator personnel and the AHJ.

#### **6.2.5 Repairs**

Repairs to units shall be made as soon as practical. Abnormal functioning or equipment defects discovered during operation, inspection, maintenance, or testing shall be reported to the unit's owner or Maintenance Manager as soon as possible. All potentially hazardous conditions disclosed through general observation, or inspection shall be corrected before use of the affected unit can resume.

#### **6.2.6 Units Not in Service**

##### **6.2.6.1 Removal from Active Service**

Units formally removed from active service (see Definitions) are not required to receive inspections, maintenance, or testing until there is a need to reactivate them.

#### **6.2.6.2 Reactivation**

Units formally removed from active service are required to receive inspection, maintenance, and possibly testing, as identified below, before they can be used again, or returned to active service.

-Proposed use will be within six months of last certified inspection; exercise the unit before use (operate unit through two top to bottom cycles, open and close access). Correct all deficiencies before using unit.

-Proposed use will be beyond six months of last certified inspection; conduct a certified inspection. Perform maintenance as dictated by inspection findings

## **7.0 RECOMMENDED AND GOOD PRACTICES**

The information provided in this section is recommended based on acceptable industry practices and should be implemented by each user based on the unique application and operating history of the subject systems/equipment.

### **7.1 Operations Recommendations**

Successful facilities have had in place a work order for use in emergencies so that call-outs may be initiated for elevator personnel to assist in the removal of persons from malfunctioning elevators.

### **7.2 Maintenance Recommendations**

MSS-MP has available a number of step by step checklists that meet and often exceed the requirements for maintenance and testing from this Criterion. These checklists are available as PMI 40-25-003 *Elevator Maintenance, Repair and Testing*.

## **8.0 GUIDANCE**

### **8.1 Operations Guidance**

If an elevator is used infrequently, (less often than every 2 years) consider placing the elevator out of service until needed. However, also realize that planning a return to service must be done well in advance.

There are some freight elevators designed to take single piece loads up to 120% of capacity at reduced speed. This can only be done with proper planning and inspections. Also there are Code prerequisites for using freight elevators in this mode. Check with the AHJ and/or MSS-MP if this option is to be considered.

## 8.2 Maintenance Guidance

Maintenance of high traffic elevators with no backup system often requires maintenance to be performed in off hours. This should be factored into any maintenance budgeting to avoid surprises.

## 9.0 REQUIRED DOCUMENTATION

**Table 9-1 Documentation Parameters**

<b>MAINTENANCE HISTORY DOCUMENTATION PARAMETERS</b>				
<b>PARAMETER</b>	<b>ML 1</b>	<b>ML 2</b>	<b>ML 3</b>	<b>ML 4</b>
<b>Maintenance Activities</b>				
Test of Firefighters' Emergency Operation	X	X	X	X
Repair / Adjustments	X	X	X	X
PM Activities	X	X	X	X
<b>Equipment Problems</b>				
Failure Dates	X	X	X	X
Failure Root Cause	X	X		
<b>Inspection Results</b>				
Inspection Date	X	X	X	X
SSC Condition	X	X	X	X

*Basis:* Documentation of the parameters listed in Table 9-1 above satisfies the requirements of P 950, Section 3.5.15 which states, "A maintenance history and trending program is maintained to document data, provide historical information for maintenance planning, and support maintenance and performance trending of facility systems and components"

### 9.1 Code Maintenance Documentation Requirements

Maintenance records shall document compliance with section 8.6 of ASME A17.1 and shall include records on the following:

- description and dates of maintenance tasks performed
- description and dates of examinations, tests, adjustments, repairs and replacements
- description and dates of call backs (trouble calls) or reports to elevator personnel by any means, including corrective action taken

- written records of the findings on the monthly check of firefighter's emergency recall operation.

The maintenance records shall be available to the elevator personnel for the unit in question.

Up-to-date wiring diagrams detailing circuits of all electrical protective devices and critical operating circuits shall be made available in the units' equipment or machinery room per ASME 17.1, Section 8.6.1.6.3.

## **10.0 REFERENCES**

The following references, and associated revisions, were used in the development of this document.

- 10.1 P 315, *Conduct of Operations Manual*
- 10.2 P 950, *Conduct of Maintenance*
- 10.3 PD 311, "Requirements System and Hierarchy", Rev. 1
- 10.4 ASME A17.1,-2007 Safety Code for Elevators and Escalators
- 10.5 ASME A17.2-2007, Guide for Inspection of Elevators, Escalators and Moving Walks
- 10.6 ASME A17.4-1999 (R-2009), Guide for Emergency Personnel
- 10.7 ASME A17.4-1999 (ERRATA-2002), Guide for Emergency Personnel
- 10.8 ASME A18.1-2008, Safety Standard for Platform Lifts and Stairway Chairlifts
- 10.9 ASME QEI-1-2007, Standard for the Qualification of Elevator Inspectors

## **11.0 APPENDICES**

Appendix A: Periodic Inspection and Testing Intervals

Appendix B: Elevator Inspection Report - Violations Summary

## Appendix A: Periodic Inspection and Testing Intervals (months)

Equipment Type		Periodic Inspections		Category 1 Periodic Test		Category 3 Periodic Test		Category 5 Periodic Test	
Ref	Description	Reference Section	Interval	Reference Section	Interval	Reference Section	Interval	Reference Section	Interval
A17.1									
8.11.2	Electric Elevator	8.11.2.1	6	8.11.2.2	12	None	N/A	8.11.2.3	60
8.11.3	Hydraulic Elevator	8.11.3.1	6	8.11.3.2	12	8.11.3.3	36	8.11.3.4	60
8.11.5.4	Electric Dumbwaiters	8.11.2.1	12	8.11.2.2	12	None	N/A	8.11.2.3	60
8.11.5.4	Hydraulic Dumbwaiters	8.11.3.1	12	8.11.3.2	12	8.11.3.3	36	8.11.3.4	60
8.11.5.5	Electric Material Lifts and Dumbwaiters with Automatic Transfer Devices	8.11.2.1	12	8.11.2.2	12	None	N/A	8.11.2.3	60
8.11.5.5	Hydraulic Material Lifts and Dumbwaiters with Automatic Transfer Devices	8.11.3.1	12	8.11.3.2	12	8.11.3.3	36	8.11.3.4	60
Ref A18.1	Description	Reference Section	Interval	Reference Section	Interval	Reference Section	Interval	Reference Section	Interval
Sect. 2, 3 or 4	Vertical or Inclined Platform Lift, Inclined Stairway Chairlift	10.2.2	6	10.3.1	12	10.3.2	36	10.3.3	60

