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

**TITLE: FIRE DAMPERS**

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**DUSA CLASSIFICATION STATEMENT**

The information contained in this document conforms to the official definition (including its specific exclusions) of the Construction and Facilities Engineering (CONST) Designated Unclassified Subject Area (DUSA), therefore it is exempt from classification and sensitive information review requirements.

Documents intended for public release must still be processed through the publication release section of the Classification Group.



### RECORD OF REVISIONS

Revision No.	Date	Description
0	08/27/98	Initial Issue
1	05/31/02	This revision reflects the conversion from a WordPerfect document into a Microsoft Word document and additional clarification on how to develop criteria. This revision includes: <ul style="list-style-type: none"><li>• The addition of a Table of Contents,</li><li>• The use of basis statements in Sections 6, 7, and 9.</li><li>• Revision to Section 9, "Required Documents," and</li><li>• Further clarification in the use of references.</li></ul>
	7/29/02	Incorporation of wording changes from FM Council in Section 6.0
	6/3/10	Changes reflect current LANL organizations Updated current Codes to reference NFPA 90A, 2009 Edition, and NFPA 80, 2010 Edition. Verified references to SMACNA's "Fire, Smoke and Radiation Damper Installation Guide for HVAC Systems" Fifth Edition 2002.

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## CRITERION 734 FIRE DAMPERS

### 1.0 PURPOSE

The purpose of this Criterion is to establish the minimum requirements and best practices for operation and maintenance of fire dampers 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.

Implementation of this Criterion satisfies LANL PD 1220, *Fire Protection Program*, 10 CFR 851, *Worker Safety and Health Program*, Appendix A.2 "Fire Protection," and DOE Order 420.1B, *Facility Safety*, Chapter II "Fire Protection" ITM requirements for the subject equipment / system. Compliance with 10 CFR 851 and DOE Order 420.1B are required by the LANL Prime Contract (DOE Contract No. DE-AC52-06NA25396)

### 2.0 SCOPE

The scope of this Criterion includes the routine inspection, testing, preventive maintenance and predictive maintenance of fire dampers. This Criterion does not address corrective maintenance actions required to repair or replace equipment.

### 3.0 ACRONYMS AND DEFINITIONS

#### 3.1 Acronyms

AHJ	Authority Having Jurisdiction
CFR	Code of Federal Regulations
DOE	Department of Energy
DSA	Documented Safety Analysis
FOD	Facility Operations Director
FP-DO	Fire Protection Division Office
ITM	Inspections, Testing and Maintenance
LANL	Los Alamos National Laboratory
ML	Management Level
MM	Maintenance Manager
MSS	Maintenance and Site Services

NFPA	National Fire Protection Association
OM	Operations Manager
O&M	Operations and Maintenance
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SSC	Structures, Systems and Components
TSR	Technical Surveillance Requirement

### 3.2 Definitions

**Breakaway Connection** - A joint connecting a fire damper sleeve and attached duct work which will allow collapse of the ductwork during a fire without disturbing the integrity of the fire damper.

**Fire Damper**-a ventilation damper located within ventilation system ductwork at the point where the ductwork penetrates a fire rated barrier. It is designed and tested to remain in the open position during normal operation and to automatically close during a fire on one side of the fire barrier. Automatic closure is typically initiated by the melting of a fusible link on the damper. In the closed position, it retards or prevents the passage of heat and flame across the fire barrier, inside the duct, thereby preventing spread of fire from one side of the barrier to the other. A "fire damper" is not credited with preventing the spread of smoke through ductwork.

**Note:** A "fire and smoke" damper is credited with the fire damper function (above) and with minimizing or preventing spread of smoke through ductwork.

A "Dynamic" fire damper is designed to close under normal air flow, and will always be equipped with closure springs.

A "Static" fire damper is not designed to close under normal air flow. Only horizontal dampers of this type are equipped with closure springs.

**Fire Damper Sleeve** - A steel enclosure surrounding a fire damper, in an air passage penetration of a fire rated barrier mounted in such a manner that disruption of attached ductwork, if any, will not impair operation of the fire damper. Sleeves may be omitted on certain alternative damper arrangements.

**Listed or Approved**-All fire protection equipment is required to be listed or approved for its intended use by an independent testing organization such as Underwriters Laboratories (UL) or Factory Mutual (FM).

**Management Level (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.

## **4.0 RESPONSIBILITIES**

### **4.1 MSS-Division Leader (MSS-DL)**

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 (MSS-MP)**

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

### **1.1 Fire Protection Division Office (FP-DO)**

Fire Protection Division is responsible for the technical content of this Criterion and monitoring the proper implementation across the Laboratory.

Fire Protection Division shall provide technical assistance to support implementation of this Criterion.

Fire Protection is responsible for determining what dampers are credited as fire dampers, and for transmitting this information to the FOD and MM for incorporation into the Master Equipment List (MEL).

### **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.

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

The AHJ (LANL Fire Marshal) is responsible for providing a decision on specific technical questions regarding the systems or equipment relevant to this Criterion.

The LANL Fire Marshal is the approval authority for all exceptions and variances to this Criterion. The LANL Fire Marshal cannot approve deviations or exemptions to CFR,

DOE Orders or NFPA Codes and Standards – the fire protection AHJ for these matter is the LASO Manager per DOE O 420.1B (see PD 1220).

## **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 433.1B 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) identified above.

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.

## **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 in conjunction with the LANL Fire Marshal approve or deny 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.

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**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 Representative 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 Operations Checklist

Fire dampers must remain operational at all times. Fire dampers shall be deemed operational when the following conditions are met:

1. Fire dampers are properly installed in the proper configuration in all required openings (see attached information for guidance).
2. Each fire damper is "Listed or Approved" and is in good repair.
3. Fire dampers are normally open, and are arranged for automatic closure (with actuation by heat, for example). NOTE: A fire damper in the closed position due to abnormal conditions may be considered operable from a fire protection standpoint, but the closed position of the damper may make the ventilation system inoperable.

*Basis:* NFPA 90A, 2009 Edition, *Standard for the Installation of Air Conditioning and Ventilating Systems*, Section 4.3.9, 4.3.10, and Annex B.1, and B.2.

NFPA 80, 2010 Edition, *Fire Doors and other Opening Protectives*, Section 19.3

## 6.2 Maintenance Requirements

**CAUTION:** The inside of ductwork is generally considered a confined space. Follow appropriate LANL guidelines and requirements for working in confined spaces.

### 6.2.1 Inspection

Every two years, examine each fire damper using the following criteria:

1. Fire damper is properly installed in accordance with SMACNA guidelines for fire damper installation (see Appendix C to this Criterion for selections from SMACNA guidelines).
2. Retaining angles are properly installed to cover the required gap between the damper/sleeve and the structural opening, and shall be verified to overlap the

structural opening. Angles are not to be attached to the wall or floor; only to the sleeve.

3. Damper is properly attached to sleeve (tack-welded, bolted, screwed, or riveted).
4. Damper (including frame/sleeve) is not rusted, bent, or blocked such that the damper closure would be prevented.

NOTE: If required perimeter gap between damper/sleeve and structural opening has been filled with grout or other seal material, damper frame may be bowed in, preventing damper closure.

5. Damper springs are not rusted, bent or (if flat type, as on curtain dampers) twisted.
6. For curtain type dampers, retaining straps on which the fusible link is installed should not extend underneath the bottom damper blade (this can impede damper closure), however this may not be preventable where the fusible link is small. In all cases, the fusible link must be centered on the bottom damper blade.
7. Where duct is attached to sleeve or damper, ensure the connection is an approved duct breakaway connection.
8. Fusible link and/or actuators are in working order (no obvious deficiencies or flaws such as excessive rust or deformation of components).
9. Fusible link is Listed or Approved by an independent testing laboratory, and is not rated less than 160°F. (Link should be marked with Listing or Approval, and should be labeled with temperature rating. If this information cannot be obtained from visual inspection, replacement of link with one of known manufacture and rating is recommended.)
10. Damper is properly labeled. (Fire damper label is typically attached to inside of damper frame or bottom curtain on curtain-type dampers, and indicates Approval or Listing by a recognized independent testing laboratory. If a label cannot be located, contact the LANL Fire Marshal for disposition.)

*Basis: NFPA 90A, 2009 Edition, Standard for the Installation of Air Conditioning and Ventilating Systems, Annex B; SMACNA Fire, Smoke and Radiation Damper Installation Guide for HVAC Systems; and PD 1220, Fire Protection Program.*

### 6.2.2 Operational Testing

**CAUTION:** All tests shall be performed in a safe manner by personnel wearing the proper personal protective equipment.

**CAUTION:** Fire dampers can close with considerable force. Flat-type damper springs have sharp edges. Take appropriate safety precautions to prevent injury to hands and fingers.

1. All new fire dampers shall be tested as part of installation acceptance testing.

2. Dampers shall be tested and inspected 1 year after installation.
3. Dampers shall be tested after any repair work or maintenance.
4. The test frequency then shall be every 4 years.

*Basis:* NFPA 90A, 2009 Edition, *Standard for the Installation of Air Conditioning and Ventilating Systems, Annex B*, and NFPA 80 2010 Edition, *Fire Doors and Other Opening Protectives*, Section, 19.4.

### **6.2.3 Maintenance**

1. Any reports of airflow change or noise from the duct work shall be investigated to verify that there is not a problem with dampers
2. Repairs shall be performed without delay if a damper is not operating.
3. The damper's exposed moving parts shall be dry lubricated to meet manufacturer requirements.
4. Any and all maintenance shall be documented to comply with NFPA 80, Section 19.4.9, and 19.4.10.

*Basis:* NFPA 90A, 2009 Edition, *Standard for the Installation of Air Conditioning and Ventilating Systems, Annex B*, and NFPA 80, 2010 Edition, *Fire Doors and Other Opening Protectives*.

### **6.3 Impairments and Modifications**

If one or more of the operations checklist requirements listed in Section 6.1.1 above are not maintained, follow the actions outlined in Criterion 733, *Fire Protection System Impairment Control Program*.

Visually inspect fire damper before returning it to service following maintenance or modification.

Conduct an operational test of the fire damper before returning it to service following maintenance or modification.

### **6.4 Personnel**

Fire alarm service personnel shall meet the qualification and experience requirements of NPFA 72. LANL will use personnel certified by a nationally recognized fire alarm certification organization for any required fire alarm verification.

*Basis:* PD 1220, *Fire Protection Program*, Section 4.15.

## **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**

Operational testing and alarm verification should be conducted by MSS Fire Protection Maintenance personnel, in compliance with PD 1220, Fire Protection Program.

Where operational testing for specialty fire suppression systems or unique fire detection and alarm equipment is provided by an off-site vendor, MSS personnel are required to provide support for this operational testing by managing alarm signal verifications and communications at and from the building DACS fire alarm control panel with the LANL proprietary fire alarm system.

Operational testing may be conducted by other than MSS personnel. Testing personnel must consider the potential for the ventilation system to be made inoperable during testing and should identify contingency plan prior to testing.

## **7.2 Maintenance Recommendations**

Persons other than MSS maintenance personnel may conduct visual inspection requirements identified in this document.

Installation of a brass tag at the fire damper may be done to indicate date of last inspection. Installation of such a tag must not interfere with proper operation of the damper.

As a core function, MSS provides inspection, testing, and maintenance services for complex fire protection systems and shall remove systems from service for testing, drills, modifications and related activities.

*Basis: PD 1220, Fire Protection Program, Section 4.15.*

## **8.0 GUIDANCE**

### **8.1 Operations Guidance**

None

### **8.2 Maintenance Guidance**

None

## **9.0 REQUIRED DOCUMENTATION**

Maintenance history shall be maintained by the Facility Manager for fire dampers to include, as a minimum, the parameters listed in the Table 9-1 below:

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>Fire Damper Maintenance Activities</b>				
Repair / Adjustments	X	X	X	X
PM Activities	X	X	X	X
<b>Fire Damper Equipment Problems</b>				
Failure Dates	X	X	X	X
Failure Root Cause	X	X	X	X
<b>Fire Damper Inspection Results (per this Criterion)</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 AP-MNT-010, *Maintenance History*, and NFPA 90A."

## 10.0 REFERENCES

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

- 10.1 10 CFR 851, *Worker Safety and Health Program*, Appendix A.2 "Fire Protection."
- 10.2 DOE Order 420.1B, *Facility Safety*, Chapter II "Fire Protection."
- 10.3 P 315, *Conduct of Operations Manual*
- 10.4 P 950, *Conduct of Maintenance*
- 10.5 PD 1220, *Fire Protection Program*.
- 10.6 AP-341-502, *Management Level Determination*
- 10.7 AP-341-516, *Operability Determination and Functional Assessment*
- 10.8 O&M 733, *Fire Protection System Impairment Control Program*.
- 10.9 NFPA 90A, *Standard for the Installation of Air Conditioning and Ventilating Systems*, 2009 Edition.
- 10.10 NFPA 80, *Standard for Fire Doors and Other Opening Protectives*, 2010 Edition
- 10.11 SMACNA, *Fire, Smoke and Radiation Damper Installation Guide for HVAC Systems*.

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## 11.0 APPENDICES

Appendix A: Two Year Fire Damper Inspection Checklist

Appendix B: Fire Damper Testing Steps

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## Appendix A

### Two Year Fire Damper Inspection Checklist

Examine each damper using the following criteria:

- Fire damper is properly installed in accordance with SMACNA guidelines for fire damper installation (see SMACNA Fire, Smoke and Radiation Damper Installation Guide for HVAC Systems).
- Retaining angles are properly installed to cover the required gap between the damper/sleeve and the structural opening, and shall be verified to overlap the structural opening. Angles are not to be attached to the wall or floor, but only to the sleeve.
- Damper is properly attached to sleeve (tack-welded, bolted, screwed, or riveted).
- Damper (including frame/sleeve) is not rusted, bent, or blocked such that the damper closure would be prevented

**NOTE:** If required perimeter gap between damper/sleeve and structural opening has been filled with grout or other seal material, damper frame may be bowed in, preventing damper closure.

- Damper springs are not rusted, bent or (if flat type, as on curtain dampers) twisted.
- For curtain type dampers, retaining straps on which the fusible link is installed should not extend underneath the bottom damper blade (this can impede damper closure), however this may not be preventable where the fusible link is small. In all cases, the fusible link must be centered on the bottom damper blade.
- Where duct is attached to sleeve or damper, ensure the connection is an approved duct breakaway connection.
- Fusible link and/or actuators are in working order (no obvious deficiencies or flaws such as excessive rust or deformation of components).
- Fusible link is Listed or Approved by an independent testing laboratory, and is not rated less than 160 degrees F. (Link should be marked with Listing or Approval, and should be labeled with temperature rating. If this information cannot be obtained from visual inspection, replacement of link with one of known manufacture and rating is recommended).
- Damper is properly labeled. (Fire damper label typically is attached to inside of damper frame or bottom curtain on curtain-type dampers, and indicates Approval or Listing by a recognized independent testing laboratory. If a label cannot be located, contact the LANL Fire Marshal for disposition).

*Basis:* NFPA 90A, 2009 Standard for the Installation of Air Conditioning and Ventilating Systems, Annex B..

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## Appendix B

### Fire Damper Testing Steps

**CAUTION:** Prior to operational testing of any fire damper, inspect the fire damper label to determine if the fire damper is a Dynamic fire damper or a Static fire damper. Static fire dampers, and any damper that cannot be verified to be Dynamic, must be drop tested under NO AIR FLOW conditions to avoid damage to damper/ductwork.

**CAUTION:** Fire dampers can close with considerable force. Flat-type damper springs have sharp edges. Take appropriate safety precautions to prevent injury to hands and fingers.

- (a) All new fire dampers shall be tested as part of installation acceptance testing.
- (b) All fire dampers shall be tested as part of acceptance testing following fire damper repair work or work on associated ductwork or fire barrier penetration.

**NOTE:** If the fire damper is DYNAMIC, the test shall be performed under Normal Air Flow conditions.

**NOTE:** If the fire damper is STATIC, the test shall be performed under No Air Flow conditions.

- (c) Fire dampers shall be tested once every 4 years using the following steps:
  1. Remove the fusible link and verify that the damper fully closes and latches (if a latch is installed).
  2. Re-open damper and re-install fusible link.
  3. Lubricate moving parts and/or clean damper as deemed necessary.