



Conduct of Engineering Request for Variance or Alternate Method

Assigned by SMPO or SMPOR: [ ] Alternate Method [x] Variance

Tracking number: VAR-2012-092

1.0 Affected Document(s)

Engineering Processes (e.g., P 341)
Engineering Standards (e.g., P 342)
Engineering Training & Qualification (e.g., P 343)
Subordinate (Functional Series) document if applicable (ESM Chapter, Master Spec, AP, etc.):
Document Title/Number: ESM Chapter 4
Revision: 3

Section/Para
Section B-C-GEN, E20 Furnishings, 1.0.A

Specific Requirement(s) as Written in the Document(s)
System or "Contract" furniture shall not be anchored to partitions or walls but shall be free-standing and self-supporting.

2.0 Request

Brief descriptive title:
Anchoring Overhead Storage/Flipper Units

NCR required (work has occurred)? [ ] Yes [x] No If Yes, NCR Number

TA-Bldg-(Room) and/or Project Affected
Various/Labwide
System/Component Affected
Wall-Mounted Overhead Storage/Flipper Units

Proposal
The approved anchoring method described in attached Memo ES-DE-12-006 may be used to anchor overhead storage /flipper units to walls.

Justification/Compensatory Measures
Required anchorage described in Memo ES-DE-12-006 is supported by Engineering Calculation No. CAL-12-00-0000-0011-S-R-0

Duration of Request: Start Date: 5/8/2012 End Date: [x] Lifetime

Requestor Hugo Escobedo Z Number 259655 Organization ES-DE Signature Signature on File Date 5/16/12

USQD/USID required (Nucl. High/Mod Hazard)? [ ] Yes [ ] No If Yes, USQD/USID Number

Design Authority Representative Lawrence K. Goen Z Number 106351 Organization ES-DO Signature Signature on File Date 6/20/12

LANL Owing Manager (FOD or Programmatic) Lawrence K. Goen Z Number 106351 Organization ES-DO Signature Signature on File Date 6/20/12

3.0 Safety Management Program Owner (SMPO) Representative (SMPOR/POC)

[ ] Decline [ ] Accept [ ] Accept Labwide [ ] with Modification:

POC David Carr Z Number 108107 Signature Signature on File Date 5/23/12

4.0 Additional Approval for P341 and APs; P342, ESM, Code, and Regulation Matters; and P343

[x] Accepted [ ] Accepted with comments [ ] Declined

Comments:

Safety or Security Management Program Owner Lawrence K. Goen Z Number 106351 Signature Signature on File Date 6/20/12

## memorandum

### *Engineering Services*

Design Engineering

**SUBJECT: ANCHORING OVERHEAD STORAGE/FLIPPER UNITS**

#### **Background:**

An analysis was performed in an aim to establish a new standard for anchoring overhead storage/flipper units to interior walls. The flipper units are manufactured by two companies: Herman Miller and Haworth. Both manufacturers provided a document outlining installation instructions for LANL review. Of primary interest was determining the adequacy of the manufacturer's recommended installation methods to resist code-based gravity and seismic force demands. It was understood that there is a need for the overhead storage units to be anchored to several wall types. The focus of this analysis was anchorage to the wood, concrete, and metal stud walls.

The current installation method practiced at LANL consists of mounting the storage units to manufacturer provided vertical tracks. The vertical tracks are aligned with the sides of the storage units and attached directly to the gypsum board using toggle bolts spaced at approximately twelve inches on center. The spacing of the vertical tracks is governed by the width of the storage units, which vary between 2'-0" and 5'-0" wide. It was determined that toggle bolts are not compliant with LANL ESM Chapter 5 requirements due to the lack of an ICC report. Furthermore, the standard installation shall require anchoring directly to existing wall studs.

It was understood that the typical storage unit configurations include stacking multiple rows of wall-mounted storage units. This study determined the maximum number of allowable columns and rows based on fastener capacity. Special mounting configurations, including stacking more than three rows, shall be analyzed on a case-by-case basis and are outside the scope of this work. The standard shall be limited to buildings up to three stories tall, which includes the majority of the buildings on LANL property.

#### **Approved method for anchoring overhead storage/flipper units:**

The following are general requirements and limitations:

1. Overhead storage units shall be manufactured by Herman Miller, Haworth, or approved equal.
2. The unit width shall not exceed 5'-0".
3. Project to confirm wall is anchored or laterally braced to the floor or roof above prior to installation. Wall must be supported at top and bottom.
4. The units may be installed in buildings three stories or less (Height in structure of point of attachment w/ respect to the base is less than or equal to 28 ft.)
5. The unit may be attached to the following materials: concrete, metal and wood studs.
6. Shelves shall be aligned and positioned per manufacturer's instructions.

7. Anchorage to masonry shall require attaching the vertical tracks with thru-bolts and backing plates per the limitations in LANL ESM Chapter 5 Section II.6.0. The design of anchorage to masonry is outside the scope of Variance, VAR-2012-092.

The following anchoring method shall be used in lieu of the manufacturer's instructions:

#### General

1. Screws shall be installed at 12 inches o/c max spacing.
2. A minimum of 8 screws shall be used per wall track.
3. On stud walls, existing studs shall be located prior to installation. Wall tracks shall be centered with the existing studs.
4. Where manufacturer requires wall tracks installed side by side (e.g. Haworth), the installer shall ensure the total width of the two tracks is less than 1-1/2 inches. For this condition, the installer shall stagger the wall tracks as required to achieve a minimum spacing between adjacent screws of 3 inches.

#### Metal Studs

1. Use 1/4" dia x 2" Hilti self-drilling screws (part no. S-MD 1/4-14x2 HWH#3).
2. Where the wall can be shown to have a single layer of gypsum, use 1/4" dia x 1-1/2" Hilti self-drilling screws (part no. S-MD 1/4-14x1 1/2 HWH#3).
3. A maximum of three continuous rows of 2 ft wide units, two continuous rows of 3 ft - 4 ft wide units wide units, or a single column of two 5 ft wide units may be installed.

#### Wood Studs

4. Use Simpson SDS 1/4x2-1/2" screws (part no. SDS1/4x2-1/2).
5. Where the wall can be shown to have a single layer of gypsum, use Simpson SDS1/4x2" screws (part no. SDS1/4x2),
6. A maximum of three continuous rows of 2 ft wide units or two continuous rows of 3 ft - 5 ft wide units may be installed.

#### Concrete Walls

7. Existing reinforcement shall be located prior to installation. Move tracks as required to avoid anchor conflicts with the existing rebar. Do not damage existing rebar.
8. Project to confirm concrete wall thickness is greater than or equal to six inches.
9. Use Hilti KH-EZ anchors.
10. A maximum of three continuous rows of 2 ft wide units or two continuous rows of shelves of 3 ft - 5 ft wide units may be installed.

Calculation (CAL-12-00-0000-0011-S-R-0)  
available from record copy of variance or  
from Document Control Records  
Management POC