
Installed Beryllium Containing Materials – Final Report

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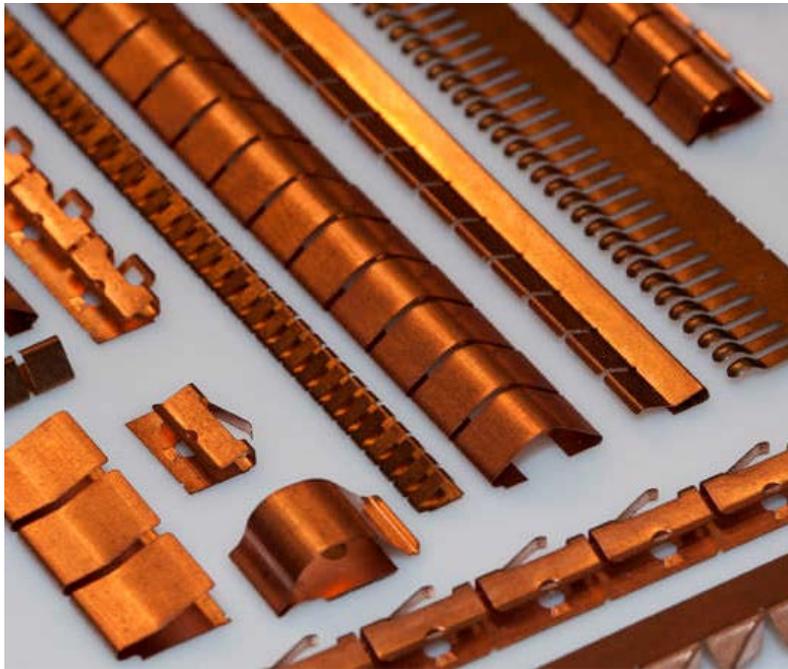
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What Is Installed Beryllium Material?

Typically beryllium copper alloy material (finger stock) used to provide electro-magnetic shielding and electrical continuity on doors and other openings into Faraday cages, screen rooms, or shielded rooms.



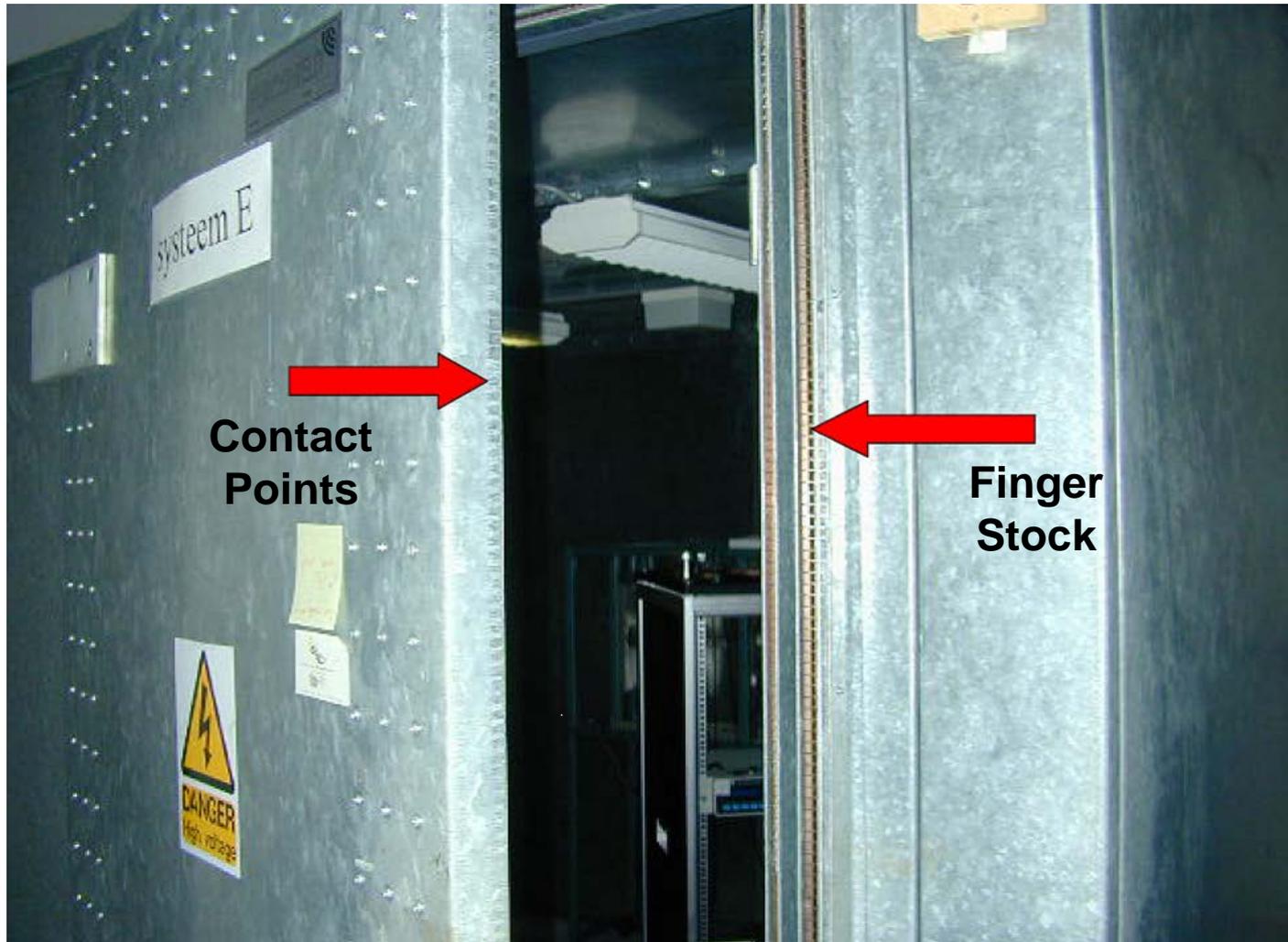
Examples of Screen Rooms



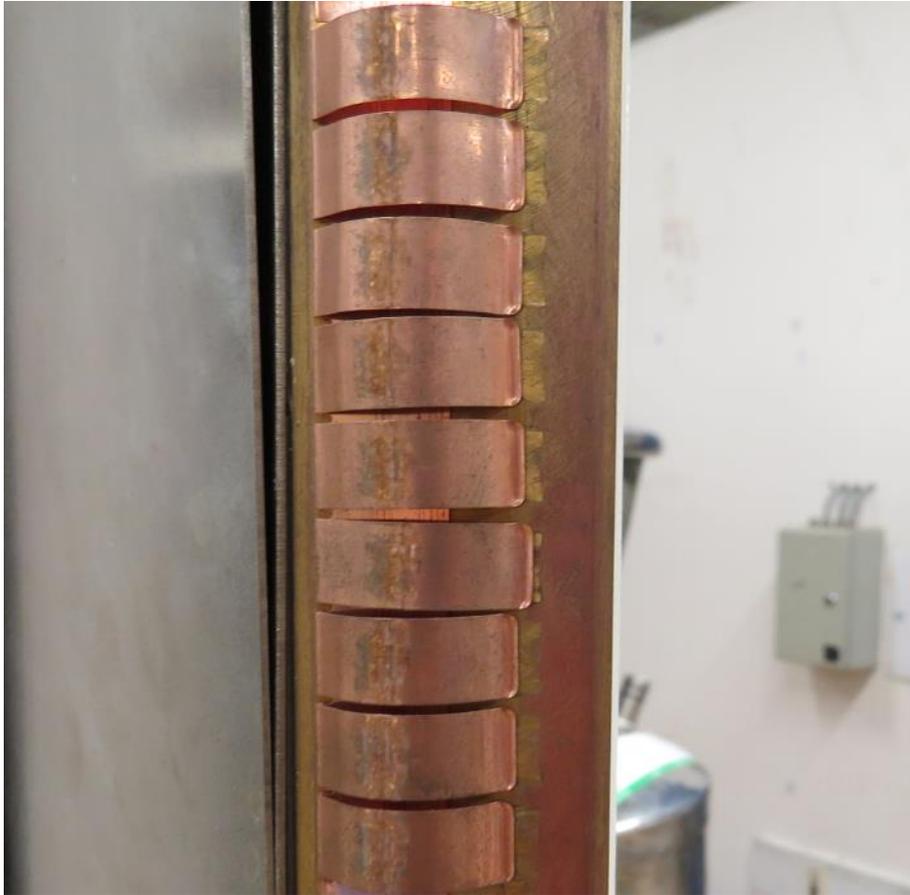
Examples of Shielded Rooms



Example of Installed BeCu Finger Stock



Example of Installed BeCu Finger Stock



Installed on Door



Installed on Frame

What Happened?

- Beryllium surface contamination was discovered on the screen room doors in a tunnel at Nevada National Security Site (NNSS).
- LANL conducted an Extent of Condition (EOC) evaluation to determine if beryllium contamination from installed beryllium containing materials was also a concern here.
- EOC evaluation indicated 16 of the 43 areas evaluated (37%) had beryllium surface contamination exceeding the LANL housekeeping guideline for non-beryllium areas of 0.2 ug/100 cm².

Surface Sampling Results

- 43 locations were evaluated:
 - 11 locations (25%) had samples ≥ 0.2 ug/100 cm²
 - 5 locations (12%) had samples ≥ 3.0 ug/100 cm²
- 396 samples collected with 216 results (55%) above the 0.013 ug analytical reporting limit.
- Results (all per 100 cm²)
 - Non-Detect 180 46% (LOQ = 0.013 ug)
 - Detect to 0.2 ug 168 42% mean = 0.03 ug
 - 0.2 ug to 3.0 ug 37 9.3% mean = 0.91 ug
 - ≥ 3.0 ug 11 2.7% mean = 23.0 ug
 - ≥ 3.0 ug (-max) 10 2.5% mean = 5.3 ug

Surface Sampling Results (continued)

- Maximum appears to be an outlier. Of the samples with reportable results:
 - Maximum = 200 ug/100 cm². Next 5 highest 10, 8.6, 5.0, 4.9, & 4.6 ug/100 cm²
 - Mean (without maximum) = 0.43 ug/100 cm²
 - Median (without maximum) = 0.024 ug/100 cm²
- Caution must be taken in interpreting results. Sampling was focused on finding contamination.
- Initial samples were collected on areas most likely to be contaminated. Follow-up samples collected on areas away from source to check for contamination spread.

Location of Contamination



Follow-Up Samples on Worst-Case Room

- 28 follow-up samples collected in the shielded room and adjacent areas outside room.
- Three samples on door & frame were found to have elevated beryllium contamination (2.4, 4.3, and 5.0 ug/100 cm²).
- All other samples below 0.2 ug/100 cm². Most below LOQ.
- No contamination spread beyond door.
- Sampling of undisturbed horizontal surfaces gave no indication of airborne beryllium.

This general pattern was observed when beryllium contamination was found. Contamination was limited to the finger stock, contact points, and floor at doorway

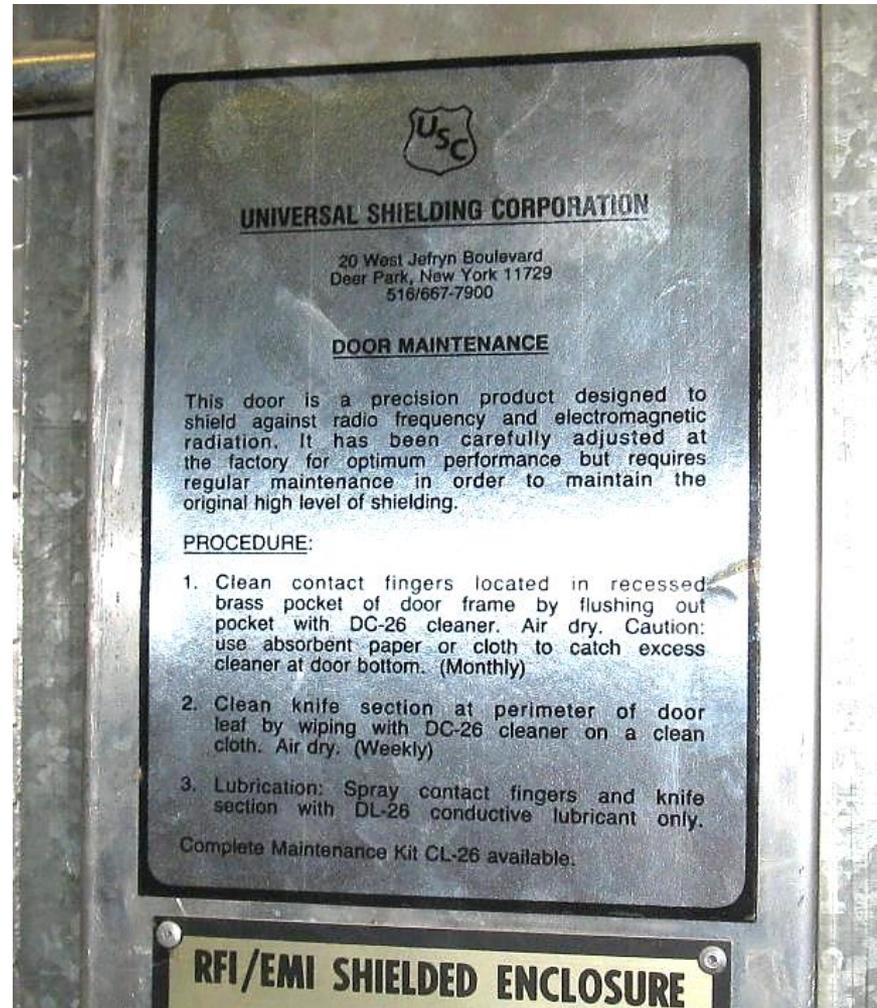
Example of Worn/Damaged Finger Stock



Cleaning/Lubricating Finger Stock

Instructions from shielded room manufacturer on cleaning and lubricating the finger stock on a monthly basis.

This was likely intended to maintain RFI shielding performance, but the cleaning would also prevent build-up of beryllium contamination and the lubrication would prevent wear and abrasion of the beryllium containing materials.



Air Sampling Results

17 air samples were collected during cleaning and/or removal of installed beryllium containing materials.

- 14 personal breathing zone samples collected:
 - 10 samples (71%) were below 0.013 ug analytical reporting limit
 - 4 samples (12%) had measurable beryllium
- Of the breathing zone samples with reportable results:
 - Maximum = 0.060 ug/m³ 8hr TWA
 - Mean = 0.025 ug/m³ 8hr TWA
- 3 area samples collected:
 - All were below 0.013 ug analytical reporting limit

Worker Notification

- Based on surface and air sampling results and the limited areas of contamination, it was not believed that there had been significant potential for worker exposure.
- However, it was recognized that workers may have concerns.
- Workers in the areas with contamination ≥ 0.2 ug/100 cm² were identified (typically only a few per location).
- Workers were sent emails identifying the areas with contamination; explaining the situation; discussing corrective actions taken; providing a POC for questions; and offering concerned workers participation in beryllium medical surveillance.
- Of the 80 workers notified, 4 requested enrollment in beryllium medical surveillance.

CBDPP Change

- A quick change to P101-21, *Chronic Beryllium Disease Prevention Program*, was issued on 02/18/15.
- This change recognizes installed beryllium containing materials and places it under the housekeeping surface contamination limits for beryllium areas.
- This allows for a more reasonable 3 ug/100 cm² on the installed beryllium containing material itself and the contact points on the door or frame rather than the 0.2 ug/100 cm² non-beryllium limit.

Installed Beryllium Material Guidance

- A guidance document on installed beryllium containing material was distributed to deployed industrial hygienists.
- The guidance formalizes the actions completed for the EOC and covers the options available for dealing with and maintaining installed beryllium containing materials in compliance with the LANL CBDPP.

OSH-Guide-003.0	Revision: 0		
Effective Date: 02/24/2015	Next Review Date: 02/24/2016		
Environment, Safety, Health Directorate Occupational Safety and Health Division Guidance Document Installed Beryllium Containing Materials			
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Name: Elena Martinez	Organization: OIO-PM	Signature: Signature on File	Date: 2-20-2015
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Subject Matter Expert: Gary Whitney	Organization: OSH-ISH	Signature: Signature on File	Date: 2-20-2015
Responsible Line Manager: Jim Coy	Organization: OSH-DO	Signature: Signature on File	Date: 2-20-2015
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Guidance Structure

- Background information including the events leading to the EOC; general outcome of the EOC; and descriptions and photos of installed beryllium containing materials.
- Guidance to industrial hygienist on evaluation:
 - Identify locations with installed beryllium containing materials,
 - Evaluate condition of materials and the potential for worker exposure or contamination spread,
 - Collect surface samples to determine if there is contamination,
 - If contaminated, properly post area and limit access,
 - Document sampling results and actions taken, and
 - Enter location in beryllium inventory.

Guidance Structure (continued)

- Path-Forward for Installed Beryllium Containing Materials :
 - Replace the beryllium-containing shielding material with a non-beryllium alternative.
 - Remove or encapsulate the beryllium-containing material.
 - Retain the installed beryllium containing material and place the area on a schedule of re-sampling and cleaning.
 - Keep the area as an Accessible Beryllium Contamination Area and restrict access.
 - Confirm that suspect finger stock or other shielding material does not contain beryllium.
- Training for workers in area.

Installed Beryllium Warning Sign

- A sign warning of the presence of installed beryllium containing material was distributed with posting instructions to deployed industrial hygienists.
- Must be posted to use the higher contamination limit.
- Standard size 5" x 7".
- Sign is available on request.



Questions



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