2101 Commonwealth Blvd, Suite B
Ann Arbor, MI 48105-5759
www.med.umich.edu/facilities/plan/

134900-H: RADIATION SHIELDING

GENERAL

In general, follow the guidelines below when designing and specifying radiation protection. Unless specifically indicated otherwise, these guidelines are not intended to restrict or replace professional judgment.

1. Shielding calculations are to be provided by MM Physicist, who will make all submissions to the state regulatory agency. A/E will provide drawings and other information as required.
2. MM Design Manager will contact the MM Physicist to calculate required shielding.
3. Each shielding room shall contain a sign within the room listing information on completed installation shielding.
    a. The AE Construction Documents shall indicate the exact wording for the Contractor Furnished and Installed sign, in the following format, to be reworded and revised to suit each room:
        i. Shielding in room number _____
        ii. North Wall: ___" lead (or other material)
        iii. Northeast Door and Wall: ____" lead(or other material)
        iv. South Wall: ___" lead(or other material)
        v. East Wall: ____" lead(or other material)
        vi. West Wall: ____" lead(or other material)
        vii. Ceiling: _____" structural concrete (and other material)
        viii. Floor:_____" structural concrete (and other material)

DESIGN REQUIREMENTS

1. **Sheet Lead**: Lead sheeting and strip material shall consist of 99.9% pure lead, conforming to Federal Specification QQ-L-201F.
2. **Fasteners**: Nails for gypsum lath shall be lead headed. Screws for securing gypsum wallboard shall conform to ASTM C646-78, covered with 1/2" diameter lead discs or plugs cemented to wallboard.
3. **Lead Shielding**: shall be of a thickness and to a height specified by MM Radiology Physicist, and approved by State Regulatory Agency. Lead shall extend the height directed by MM Radiation Physicist.

LEAD LININGS

1. Sheet lead for lining door frames (and any other metal frames occurring in lead-lined partitions) should be of the same thickness as the lead in the wall in which the frame occurs
2. Lead lining should extend around the entire perimeter of framed openings and be firmly fitted and secured to overlap lead lining in walls, doors and windows. Lead shielding should be provided for all finish hardware and for stops in door and window frames.
3. In lead lined wall surfaces, lead lining should be provided around all wall surface penetrations, such as electrical receptacle boxes, switch boxes and similar items.

NEUTRON SHIELDED DOOR ASSEMBLY

1. **Door and frame assembly should be**:
    a. A pre-engineered unit, manually operated, for containing neutron emissions and x-rays.
    b. Doors should be pre-hung to a structural steel angle assembly sub-frame, each leaf having three (3) pair adjustable heavy-duty surface-mounted ball-bearing hinges that will require no greater than ten (10) foot-pounds of effort to move the inert door leaf.
2. **Metal doors should have**:

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   a. A face sheet of 1/2" thick steel plate on the hinge side and 1/4" steel plate on opposite face side, with 1/4" thick steel plate on all four edges.
   b. Joints should be continuously welded and ground smooth.
   c. Fabricate door with beveled edges as required for operation.

3. **Optional wood doors should have**:
   a. Steel face sheet, on either side of 3/4" thick plywood core, with 1/16" thick plastic laminate.
   b. All four edges of wood door leaf should be fabricated of 16 gauge stainless steel, satin finish.
4. Threshold should consist of 1/4" thick steel plate, with anchors for flush mounting in concrete floor.

INSTALLATION

1. Continuous lead strips, 2" wide, should be centered behind all joints of wallboard panels and should be same thickness as adjacent lead sheet. All screw fastener heads should be covered with minimum 1/2" diameter lead disc or plug cemented to wallboard, set flush with wallboard surface in final installation.
2. Plywood panels should be 14" wide by 10'-0" long for vertical application, with 1" lead sheet extension along both sides of long dimension. Ten foot panels may be jointed and shielded at midpoint for two-piece installation for ease in handling if approved by the University Project Coordinator. Horizontal joint should then have lead extension same as vertical joints.
3. Shielding Plan: A shielding plan review must be conducted and a copy of the report and plan submitted to Safety Management Services. In general, MM Radiology Department's Physicist shall inspect installation of all lead lining and through wall penetrations prior to wall finish installation and test lead lining thickness before and after construction completion.