



Chapter 44: [Penetration Safety](#)
Penetration Permit Form

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 URL: <https://www-group.slac.stanford.edu/esh/eshmanual/references/penetrationsFormPermit.pdf> | [docx](#)

ENVIRONMENT, SAFETY & HEALTH DIVISION

A penetration permit is required for all Class 2 penetrations; for those Class 1 penetrations where the hazards and controls are not documented in a job safety analysis (JSA) (unless the supervisor has direct knowledge that a structure, wall, floor, or other surface does not contain electrical, gas, or other hazards); and for any penetration within a radiologically controlled area (RCA), a radioactive material management area (RMMA), or into accelerator shielding.

Any deviation from the scope of work identified on this permit requires re-approval of this permit. Permit expires 30 days after issuance.

The completed permit must be kept at the worksite during the work. Upon completion of the work the supervisor must retain the permit for at least 12 months. (See [Penetration Safety: Penetration Procedures](#) [SLAC-I-730-0A23C-002].)

Work request number (if applicable):	Date permit submitted:
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1 General Information

Area / location:	Date(s) work will be performed:	
Job description (location of penetration, material to be penetrated, tools, etc):		
Other information (depth of penetration, etc):		
Requester:	Phone number:	Organization:

Penetration Classification	Yes	N/A
Penetration is into hollow walls, hollow ceilings, or hollow floors, or a penetration into solid materials to a depth of 2 inches or less? <i>If yes, complete "Class 1 Penetration Checklist".</i>	<input type="checkbox"/>	
Penetration is deeper than 2 inches or all the way through solid materials? <i>If yes, complete "Class 2 Penetration Checklist".</i>	<input type="checkbox"/>	

Radiological Review Determination <i>If any of the following are checked, submit permit to Radiation Protection to complete "Radiological Safety".</i>	Yes	No
Penetration is within a radiologically controlled area or a radioactive material management area?	<input type="checkbox"/>	<input type="checkbox"/>
Penetration is into part of accelerator shielding (for example, the Accelerator Housing Structure, End Station A Hall, Klystron Gallery Floor)?	<input type="checkbox"/>	<input type="checkbox"/>
Penetrations that meet any of the conditions below require a radiation safety work control form (RSWCF) and approval from Radiation Physics.		
▪ Into or through non-concrete radiation shielding	<input type="checkbox"/>	<input type="checkbox"/>
▪ Into concrete radiation shielding, with penetration exceeding 2 inches in diameter	<input type="checkbox"/>	<input type="checkbox"/>
▪ Into concrete radiation shielding, with penetration exceeding 6 inches deep	<input type="checkbox"/>	<input type="checkbox"/>
▪ Into concrete radiation shielding where penetration is not refilled with a dense material (for example concrete or steel)	<input type="checkbox"/>	<input type="checkbox"/>
▪ All the way through concrete radiation shielding	<input type="checkbox"/>	<input type="checkbox"/>
▪ Into FEH hutch roof concrete radiation shielding, with penetration exceeding 3 inches deep	<input type="checkbox"/>	<input type="checkbox"/>
Non-destructive testing (NDT) involves the use of a radiation generating device (x-ray generating device, etc.)?	<input type="checkbox"/>	<input type="checkbox"/>

Silica Control Determination	Yes	No
<p>Penetrating concrete? <i>If yes, then complete following checklist:</i></p> <p>Dry penetrations (rotary hammer, drills, etc.)?</p> <ol style="list-style-type: none"> Equipped with commercially available shroud or cowl with dust collection system? Tool operated and maintained in accordance with manufacturer's instructions to minimize dust emissions? Dust collector compliant with drill tool manufacturer recommendations, with a filter-cleaning mechanism, and a filter efficiency of 99% or greater? Using HEPA filtered vacuum cleaner when cleaning holes? <p>If yes to all four questions (1-4) then no further silica analysis is required. If no to any of them then follow Chapter 56, "Respirable Crystalline Silica".</p> <p>Wet core drilling?</p> <ol style="list-style-type: none"> Core drill equipped with integrated water cooling and sufficient water flow to eliminate visible dust? Using wet vacuum cleaner or other method to collect /contain all concrete slurry before slurry dries out? <p>If yes to both questions (5 and 6) then no further silica analysis is required. If no to either question then follow Chapter 56, "Respirable Crystalline Silica".</p> <p>If performing other concrete dust-generating activities (saw cutting, jack-hammering, chipping, etc.) then follow Chapter 56, "Respirable Crystalline Silica".</p>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

2 Class 1 Penetration Checklist

Complete for penetrations into hollow walls, ceilings or floors, or 2 inches or less into solid material

	Yes	N/A
Checked other side of walls, under floors, or through false ceilings for hazards? Caution For roofing work, electrical raceways (conduit) may be recessed or painted the same color as the interior ceiling. Use supplemental lighting and binoculars, or a man lift or scissor lift for a closer approach to the area of inspection, if necessary to positively confirm the presence or absence of electrical raceways.	<input type="checkbox"/>	<input type="checkbox"/>
Verified stud locations?	<input type="checkbox"/>	<input type="checkbox"/>
Non-conductive tools to be used?	<input type="checkbox"/>	<input type="checkbox"/>
Masonry bits and hand tools to be used for initial penetration?	<input type="checkbox"/>	<input type="checkbox"/>
Drill bit stops or short drill bits (2 inches or less) to be used for solid material?	<input type="checkbox"/>	<input type="checkbox"/>
Electrical tools equipped with GFCIs or double insulated?	<input type="checkbox"/>	<input type="checkbox"/>
GFCIs tested?	<input type="checkbox"/>	<input type="checkbox"/>
Appropriate PPE specified (see "Controls") and obtained?	<input type="checkbox"/>	<input type="checkbox"/>
PPE inspection(s) up to date?	<input type="checkbox"/>	<input type="checkbox"/>
Checklist completed by:	Date:	

3 Class 2 Penetration Checklist

Complete for penetrations greater than 2 inches into solid material

	Yes	N/A
Reviewed historical records, engineering plans, and drawings?	<input type="checkbox"/>	<input type="checkbox"/>
Area responsible person/designee, customer/requester, or other personnel consulted?	<input type="checkbox"/>	<input type="checkbox"/>
Visually inspected proposed location of penetration?	<input type="checkbox"/>	<input type="checkbox"/>
Caution For roofing work, electrical raceways (conduit) may be recessed or painted the same color as the interior ceiling. Use supplemental lighting and binoculars, or a man lift or scissor lift for a closer approach to the area of inspection, if necessary to positively confirm the presence or absence of electrical raceways.		
Checked other side of walls, under floors, or through false ceilings for hazards?	<input type="checkbox"/>	<input type="checkbox"/>
De-energized and locked/tagged-out energy sources as required?	<input type="checkbox"/>	<input type="checkbox"/>
NDT used to determine if additional hazards exist? <i>If yes, list results in the "Hazards" section.</i>	<input type="checkbox"/>	<input type="checkbox"/>
NDT used to determine wall reinforcement?	<input type="checkbox"/>	<input type="checkbox"/>
Electrical tools equipped with GFCI or double-insulated?	<input type="checkbox"/>	<input type="checkbox"/>
GFCIs tested?	<input type="checkbox"/>	<input type="checkbox"/>
Appropriate PPE specified (see "Controls") and obtained?	<input type="checkbox"/>	<input type="checkbox"/>
PPE inspection(s) up to date?	<input type="checkbox"/>	<input type="checkbox"/>
Short drill bits used or equipment marked to limit penetration depth?	<input type="checkbox"/>	<input type="checkbox"/>
Checklist completed by:	Date:	

4 Hazards and Required Controls

Complete for all penetrations. May reference JSA or similar work authorization document if hazards / controls are documented there.

4.1 Hazards

Type and size of energy sources present (including results from NDT, if used):

Hazards specific to the tools that will be used:

Work environment hazards (such as moisture, lead, asbestos, concrete dust (silica), etc.):

Other hazards:

4.2 Controls

Procedural requirements:

Types and classification of PPE:

Other controls:

5 Radiological Safety

This section, if applicable (see Radiological Review Determination in "General Information"), must be completed by Radiation Protection, Field Operations (RPFO). Please allow two days for review.

Radiation Protection, Field Operations (RPFO) ext. 4299		
Pre-work survey required?	Yes <input type="checkbox"/>	N/A <input type="checkbox"/>
Radiological HEPA vacuum cleaner required?	<input type="checkbox"/>	<input type="checkbox"/>
Radiation safety work control form (RSWCF) required? <i>If yes, Radiation Physics must review (below).</i>	<input type="checkbox"/>	<input type="checkbox"/>
Additional requirements for this penetration? <i>If yes, describe:</i>	<input type="checkbox"/>	<input type="checkbox"/>
Reviewed by		
Name:	Signature:	Date:

Review of penetration permit by Radiation Protection, Radiation Physics (RPRP) <i>Required for any penetrations that require a radiation safety work control form (RSWCF)</i>		
Reviewed by		
Name:	Signature:	Date:

6 Approval and Authorization

6.1 Supervisor

Required for Class 1 and Class 2 penetrations

I have discussed the hazards and controls with the workers and verified that they are trained / qualified to perform the work.		
Name:	Signature:	Date:

6.2 Area / Building Manager

Required for Class 2 penetrations

Name:	Signature:	Date:
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7 Additional Requirements

- Check behind walls, under floors, or through false ceilings to attempt to locate hidden utilities or other hazards (such as asbestos). In most industrial environments, electric wiring is run in metal conduit. However, it is possible for Romex cable or other soft-surfaced electrical wiring to be present within hollow walls of some buildings, especially in some portable buildings.
- Pay particular attention to roofing penetration operations. Electrical raceways (conduit) on the interior ceiling may be particularly difficult to detect visually, especially if the raceway is recessed or painted the same color as the ceiling. Use supplemental lighting and binoculars, or a man lift or scissor lift for a closer approach to the area of inspection, if necessary to positively confirm the presence or absence of electrical raceways.
- Verify metal stud locations by measuring from adjacent studs or by using detection equipment to determine that the metal is not an electric conduit or gas pipe.
- If it is suspected that hidden hazards exist at the point of penetration, relocate the work if possible. If the work cannot be relocated, use non-destructive testing (NDT) devices (ground penetrating radar, x-ray, magnetic, induction, conductive, or other devices and methods) to determine whether additional hazards exist. For hollow structures a pilot hole may be useful to look for hidden utilities. If the penetration is to be made into a solid load-bearing wall, use NDT before performing the penetration to ensure that it does not interrupt wall reinforcement.
- Before vacuuming mineral dusts or slurries verify that fire technicians have bypassed any local smoke detectors.