Vacuum Work Plate

User Guide — Metal Cover Material Selection

Purpose. Thin, clean, non-porous metal sheet or shim stock can be used to cover vacuum holes that are not beneath the workpiece. When vacuum is applied, atmospheric pressure pulls the cover material flat against the work plate, reducing leakage and preserving holding force. The plate may be heated as required by the process, with a **maximum operating temperature of approximately 150 °C (302 °F)**. Many applications may use lower temperatures or no heat at all.

Recommended Materials

Material	Suggested thickness	Recommended use	When and why to use it
Aluminum shim stock	0.001–0.003 in	General-purpose / disposable masks	The best everyday choice for quickly masking groups of unused holes. Aluminum is inexpensive, lightweight, easy to cut with scissors or shears, and thin stock conforms readily to the plate. Well suited to wire bonding, manual assembly, microscope work, temporary setups, and general vacuum masking.
300-series stainless steel	0.001–0.003 in	Durable / reusable masks	Choose stainless when the same mask will be handled and reused repeatedly. It is tougher and more resistant to tearing and permanent creasing than very thin aluminum or copper. A good choice for dedicated fixtures and repeatable lab setups.
Copper shim stock	0.002–0.005 in	Thermal processing / hot-plate work	Useful when heat spreading or temperature uniformity is important. Copper has very high thermal conductivity and is soft enough to conform well to the plate. Good for baking, curing, thermal testing, and temperature-sensitive assembly, although it can crease more easily than stainless.
260 brass shim stock	0.001–0.003 in	Reusable / easy fabrication	A useful compromise between soft aluminum/copper and harder stainless steel. Brass is easy to cut and modify while retaining its shape reasonably well. Good for custom-cut reusable masks and fixtures that may need occasional modification.
Nickel foil / shim stock	0.001 in and up	Chemical / process-specific	Good corrosion resistance and useful thermal properties. Consider nickel when process chemistry, corrosion, or contamination requirements make aluminum, copper, or brass undesirable. Usually unnecessary for routine masking.
Grade 2 titanium	~0.005 in and up	Specialty applications	Excellent corrosion resistance and useful for chemically demanding or contamination-sensitive setups. Available material is often thicker and stiffer than ideal for routine hole masking, so use primarily when process compatibility justifies it.
Low-carbon steel	0.001–0.003 in	Temporary / low-cost fixturing	Inexpensive and relatively stiff, but susceptible to oxidation and corrosion. It can work for temporary setups but is not recommended as the standard lab cover material when aluminum or stainless steel is available.

Material Selection

Temperature capability	Operate the plate only at the temperature required by the process, up to approximately **150 °C maximum**. The bulk temperature capability of the metals listed above is generally not the limiting factor across this range. Surface coatings, oxidation, cleanliness, and compatibility with the experiment are usually more important.
Flatness and sealing	Choose clean, non-porous material that is sufficiently flat for vacuum to pull it securely against the plate. Wrinkled, heavily creased, curled, or damaged material may create leakage paths and should be flattened or replaced.
Thickness and handling	Very thin foil conforms easily and seals well over small surface irregularities, but it is easier to wrinkle, tear, or damage. Thicker shim stock is more durable and easier to reuse, but is stiffer. Freshly cut edges can be sharp; handle carefully and deburr when appropriate.
Cleanliness and coatings	Keep both sides free of chips, particles, adhesive, oil, and residue. Contamination can prevent a good seal or transfer to the workpiece. Avoid painted, adhesive-backed, polymer-coated, or otherwise coated material unless the coating has been specifically evaluated for the process and actual operating temperature.
Thermal behavior	Copper and aluminum are preferred when good heat spreading is desirable. Stainless steel is preferred when durability and repeated handling matter more than high thermal conductivity. Brass provides a useful balance between thermal performance, ease of fabrication, and shape retention.
Process compatibility	Consider the workpiece and experiment when selecting material. Relevant factors may include corrosion, chemical exposure, electrical conductivity, contamination sensitivity, oxidation, and possible reactions between dissimilar metals.

General lab guidance: Use **aluminum** as the default for quick or disposable covers; **stainless steel** for durable reusable masks; **copper** when heat spreading is important; and **brass** when easy fabrication and shape retention are both useful. Nickel, titanium, steel, and other clean non-porous metals may be used when their specific properties are beneficial to the experiment.