

Selecting and Maintaining Kiln Shelves Guide

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Kiln Troubleshooting Guide

Selecting the right kiln shelves for your kiln use and application is important. Selecting the wrong shelves can be more expensive than you need or cutting corners can end up with ruined shelves after only few firings. When selecting shelves you will have three important choices: a) the material from

which the kiln shelves are made, b) the thickness of the shelf, c) half size or full size shelves. To select the right kiln shelves you need to take into account your kiln type and style, firing temperature, firing type (e.g., oxidation, reduction, raku), glazing style used, firing frequency, ware weight and your strength. Once kiln shelves are selected and used, regular maintenance is required (kiln wash and reversing shelves).

Kiln Shelves Types

1) Cordierite Kiln Shelves * are made of Magnesium Aluminum Silicate which has very low thermal expansion and low thermal conductivity. Cordierite can withstand fast heating or cooling and is used when thermal shock is a concern traditionally used in top loading electric kilns. Cordierite kiln shelves are more susceptible to warping at higher temperatures with maximum firing temperature is cone 8. Shelves used up to cone 6 should be at least $\frac{3}{4}$ " thick, and those used to a maximum of cone 10 should be at least 1" thick which makes them heavy. Cordierite has 13-25% porosity rate which will be a problem with glaze dripping (the glaze can easily penetrate the surface and melt into the shelf). Kiln wash should therefore be used to protect the surface. Cordierite kiln shelves are not recommended for salt or wood firings.



* Cordierite, a naturally occurring mineral, composed of approximately 33% Alumina and 60% silica with small amounts of other minerals dry pressing under high pressure.

2) High Alumina Kiln Shelves ** are similar to Cordierite shelves but with higher percentage of alumina increasing the shelves' temperature rating to cone 11. They can carry heavier load and are less susceptible to warping but still require flipping / rotating to avoid sagging. High Alumina shelves are more dense compared to Cordierite and therefore more resistant to glaze drips but they still porous and require kiln wash and are not recommended for Salt, Raku or Wood firings. High-Alumina shelves are best used in electric or gas kilns.



** High Alumina (Aluminum Oxide) ceramic products are among the strongest and hardest of all ceramic materials second only to diamond. They have a high dielectric strength with excellent electrical resistance attributes. Alumina ceramics has high thermal conductivity and high resistance to chemical and corrosion.

Heavier kiln load

3) Silicon Carbide Kiln Shelves are thin, lightweight made from an advanced Nitride-bonded Silicon Carbide composition, stronger and weigh half or less compared with a conventional 1" thick Cordierite kiln shelves. They do not sag or warp after many firings under heavy loads and suitable for temperatures up to 2600°F and a great choice for Gas, Soda and firing kilns. They are about twice the cost of Cordierite or High Alumina kiln shelves cost.



Thinner kiln shelf

4) Nitride Bonded Silicon Carbide Shelves are thinner with very low mass and high strength substantially reducing thermal mass resulting in reduced energy costs. These shelves will not sag and you may never have to rotate them. ½" thickness will be sufficient to cone 11. Glaze drips and ware will release easily from shelves without the need for kiln wash with the exception of soda firing where an alumina based kiln wash is recommended. Cracks may occur in thin nitride bonded kiln shelves due to heat differences across the shelf caused by heating or cooling too quickly. It is not recommended to use nitride-bonded silicon carbide with electric kilns because they will cause a reduction which may effect the glazes and clay body in an electric kiln. Silicon carbide does conduct electricity and if an element touches the shelf a short or electrical shock risk is high.

Selecting the Right Kiln Shelves for You

1) Temperature Rating: If firing mid to high temperature (cone 4-10), kiln shelves that are too thin will sag with time so make sure you purchase the right thickness. The shelves thickness options are ½", 5/8", ¾" and 1". The decision need to take into account the firing temperature and kiln shelf length. For example, if your kiln shelf length is 30" and you fire to cone 6, 1" shelves thickness will be a wise choice.



Kiln temperature

2) Kiln Shelves Size: If you have a large kiln fired to mid/high temperatures requiring a ¾" or 1" shelves thickness, the shelves will be really heavy and difficult to carry in particular in a top loading kiln. Half shelves might be a good choice for the above reason but will also provide you with the flexibility to more efficiently fill every space in the kiln with your ware. Make sure the kiln shelves dimensions allow about 1" clearance between the shelf and kiln's walls for temperatures even distribution.

3) Your kiln atmosphere (reduction or oxidation)

4) Frequency of Firing will expedite shelf sagging if too thin or wrong shelf type selected

5) Ware weight - heavy ware will expedite kiln shelves sagging if too thin or wrong shelf type selected

Kiln Shelves Storage

Kiln shelves should be stored standing up on their edges. Storing them flat makes it more possible for them to break or cracks. Keep shelves dry. If they do get wet (e.g., after applying kiln wash), heat them slowly and soak for a few hours at 300° F.



Kiln Wash

Kiln wash is a layer of material between your pots and kiln shelves protecting your kiln shelves during glaze firing preventing glazes from sticking to your shelves. Unglazed pots can stick to the kiln shelf if the clay body vitrifies. Kiln wash is made of silica sand, alumina hydrate and kaolin. You can mix your own kiln wash or purchase.

Glaze comes in contact with the kiln shelf when something unexpected occurred (e.g., running glaze, tipped over pot) during the glaze firing even if you wiped glaze off the bottom or used stilts. If kiln wash was not used in the above possible scenarios, your pot will stick to the shelf and break trying to remove it. You will have to grind the glaze off the shelf's surface, remaining glaze soaked into the shelves will continue to erode the kiln shelf.

We also recommend applying kiln wash to the brick on the bottom of the kiln to prevent from glaze drip damaging the soft brick.

Warning: Stay away from electric kiln elements kiln wash will corrode and reduce the elements life expectancy.

Applying Kin Wash

After mixing the kiln wash with water to a consistency of "Half and Half" cream, apply 2 to 3 thin coats with a brush only on one side of the kiln shelf letting it completely dry between each coat. Keep about 1/2" on the outer part of the kiln shelf kiln wash free of kiln wash to avoid flaking dry kiln wash falling into the pots below later on. Applying kiln wash thicker will causes more peeling and / or cracking.

If you are planning to rotate / flip your shelves over every few firing, you'll need to scrape and grind all the kiln wash from the bottom side first. Failing to do so will cause kiln wash particles to fall into the pots below and ruin the glaze effect.

Grinding Off Kiln Wash Before Rotating Sides

After several firings, the kiln wash will become very thin, uneven or covered with silica from the kiln atmosphere. At that point you should grind off all of the kiln wash off the top side and apply kiln wash to the opposite side. We, at Lakeside Pottery, use the following tools:



Kiln wash flaking

Rubbing Silicone Carbide Brick with Handle used for small accidents to scrape off glaze drips and remnants of stuck pot's bottoms



4-Inch Diamond Turbo Grinding Cup Wheel Coarse Grit used when glaze accidents and removal of kiln wash is required before flipping a kiln shelf.



4-1/2" Makita Angle Grinder always use eye protection and dust mask or a respirator even if done outdoors.

