Gemstone Firing Guide 2024 www.metalclay.com.au

Many natural gemstones can be set into metal clay and fired in place. Other gemstones will not survive the heat of a kiln and can only be set after firing. The guide below is the result of kiln and torch fire tests that have been performed on both natural and synthetic gemstones. Our acknowledgement and grateful thanks to Kevin Whitmore of Rio Grande Jewelry Supply USA and Mardel Rein of Cool Tools USA who did all the hard work and testing on the gemstone included in this valuable guide.

This information can be used as a guide but regardless of rigorous testing there is always a risk of losing a natural gemstone even if others have survived firing in the past. Always be aware that some gemstones may have hidden flaws that could cause the gemstone to fail unexpectedly.
This guide aims to help metal clay users select gemstones that are known to survive kiln or torch firing from those that won't.

Natural Gemstone Firing Guide

All temperatures mentioned are full ramp unless otherwise noted. Never crash cool gemstones. **F** indicates can be Carbon and/or Torch Fired **X** indicates NO FIRE

Natural Gemstones	Mineral Group	Mohs Scale	NO FIRE	Firing Temperature	Hold Time	Open Shelf	Carbon Fire	Torch Fire 2 minutes
Agate (Cameo)	**Quartz**	**7**	**X**					
Alexandrite **	Chrisoberyl	8.5		899°C	2 Hrs		**F**	**F**
Alexandrite Cats Eye**	**Chrisoberyl**	8.5		899°C	2 Hrs		**F**	**F**
Almandine Garnet	Garnet	6.5 - 7.5		849°C	30 Min		**F**	**F**
Amazonite	Feldspar	6 - 6.5		649°C	30 Min		**F**	**F**
Amethyst	Quartz	7	**X**					
Aquamarine	Beryl	7.5 - 8	**X**					
Aventurine	Quartz	7	**X**					
Black Onyx	Quartz	7	**X**					
Black Star Sapphire	Corundum	9		899°C	2 Hrs		**F**	**F**
Carnelian	Quartz	7	**X**					
Chalcedony	Quartz	7	**X**					
Chrome Diopside	Pyroxene	5 - 6		649°C	30 Min		**F**	
Citrine	Quartz	7	**X**					
Demantoid Garnet	Garnet	6.5 - 7.5		849°C	30 Min		**F**	**F**
Diamond	Diamond	10	**X**					
Emerald	Beryl	7.5 - 8	**X**					
Fire Opal	Silicate	6 - 6.5	**X**					
Hematite	Iron Mineral	5.5 - 6.5		899°C	2 Hrs		**F**	**F**
Iolite	Iolite	7 - 7.5	**X**					
Jadeite	Quartz	5 - 6	**X**					
Labradorite	Feldspar	6 - 6.5		649°C	30 Min		**F**	
Lapis - Denim	Rock	5.5	**X**					
Lapis Luzuli	Rock	5.5	**X**					
Malachite	Borate	3.5 - 4	**X**					
Moonstone - Grey	Feldspar	6 - 6.5		649°C	30 Min		**F**	
Moonstone - Peach	Feldspar	6 - 6.5		599°C	30 Min		**F**	
Moonstone - White	Feldspar	6 - 6.5		599°C	30 Min		**F**	

(hydrothermal grown)**

Natural Gemstones	Mineral Group	Mohs Scale	NO FIRE	Firing Temperature	Hold Time	Open Shelf	Carbon Fire	Torch Fire 2 minutes
Padparadscha Sapphire	Corundum	9		899°C	2 Hrs		F	F
Peridot	Olivine	7		799°C	30 Min		F	F
Pyrite	Sulphide	6 - 6.5	X					
Pyrope Garnet	Garnet	7 - 7.5		849°C	30 Min		F	F
Rhodocrosite	Calcite	3.5 - 4.5	X					
Rhodolite Garnet	Garnet	7 - 7.5		799°C	30 Min		F	F
Rose Quartz	Quartz	7	X					
Ruby	Corundum	9		899°C	2 Hrs		F	F
Rutilated Quartz	Quartz	7	X					
Sapphire	Corundum	9		899°C	2 Hrs		F	F
Smokey Quartz	Quartz	7	X					
Spinel	Spinel	8		899°C	1 Hr		F	
Star Diopside	Pyroxene	5 - 6		649°C	30 Min		F	F
Sunstone	Feldspar	6 - 6.5		649°C	30 Min		F	
Tanzanite	Zoisite	6.5 - 7.5		871°C	30 Min		F	F
Topaz (all varieties)	Topaz	8	X					
Tourmaline - Green	Tourmaline	7 - 7.5		649°C	30 Min		F	
Tourmaline - Pink	Tourmaline	7 - 7.5	X					
Tsavorite Garnet	Garnet	7 - 7.5		799°C	30 Min		F	F
Turquoise	Phosphate	5 - 6	X					
Zircon	Neosilicate	7.5		899°C	1 Hr		F	F

- Diamonds should not be fired on an open kiln shelf. Some very clean stones can be torch fired, but a cloudy stone may result. The safest method is to fire in activated carbon. **We do not recommend firing diamonds**.
- Pyrite is dangerous in the kiln. Pyrite contains sulphur which can be explosive when heated.
- Lapis lazuli is not a mineral, but a microcrystaline rock composed mainly of the mineral lazurite, with some pyrite and white calcite
- Denim lapis is a type of lapis with less lazurite and more white calcite.

Cubic Zirconia and Lab Created Gemstone Firing Guide

All temperatures are full ramp unless otherwise noted. Never crash cool gemstones.

Cubic Zirconia Gemstones	Mineral Group	Mohs Scale	NO FIRE	Firing Temperature	Hold Time	Open Shelf	Carbon Fire	Torch Fire 2 minutes
Alexandrite	Simulant	8.5 - 9	X					
Amethyst	Simulant	8.5 - 9		913°C	2-4 Hrs	F	F	F
Champagne	Simulant	8.5 - 9		913°C	2-4 Hrs	F	F	F
Diamond - White	Simulant	8.5 - 9		913°C	2-4 Hrs	F	F	F
Diamond - Yellow	Simulant	8.5 - 9		913°C	2-4 Hrs	F	F	F
Emerald (Columbian)	Simulant	8.5 - 9		599°C	10 Min		F	
Fire Opal (Red/Orange)	Simulant	8.5 - 9		913°C	2-4 Hrs	F	F	F
Garnet	Simulant	8.5 - 9		913°C	2-4 Hrs	F	F	F
Green Apple	Simulant	8.5 - 9		599°C	30 Min		F	
Jet Black	Simulant	8.5 - 9		913°C	2-4 Hrs	F	F	
Lavender	Simulant	8.5 - 9		913°C	2-4 Hrs	F	F	F
Olivine	Simulant	8.5 - 9		913°C	2-4 Hrs	F	F	F
Sapphire - Pink	Simulant	8.5 - 9		913°C	2-4 Hrs	F	F	F
Tanzanite	Simulant	8.5 - 9		599°C	10 Min		F	
Topaz - Blue	Simulant	8.5 - 9		829°C	1 Hr		F	
Topaz - Smoked	Simulant	8.5 - 9		913°C	2-4 Hrs	F	F	F

Synthetic Lab Gemstones	Mineral Group	Mohs Scale	No Fire	Firing Temperature	Hold Time	Open Shelf	Carbon Fire	Torch Fire 2 minutes
Alexandrite	Synthetic	8.5		913°C	2-4 Hrs	F	F	F
Corundum - Blue Sapphire	Synthetic	9		913°C	2-4 Hrs	F	F	F
Corundum - Citrine Sapphire/Golden Topaz	Synthetic	9		913°C	2-4 Hrs	F	F	F
Emerald	Synthetic	7.5 - 8		799°C	30 Min		F	
Opal	Synthetic	5.5 - 6	X					
Ruby	Synthetic	9		913°C	2-4 Hrs	F	F	F
Sapphire - Padparadsha	Synthetic	9		913°C	2-4 Hrs	F	F	F
Spinel - Blue	Synthetic	9		913°C	2-4 Hrs	F	F	F

Note:

Olivine CZ's can darken after firing as can Alexandrite, Corundum and Citrine Yellow lab made gems

Activated Carbon Firing

Coconut activated Carbon is used as a firing media for copper-based clays because one of its properties is the ability to **adsorb*** oxygen. Since oxygen is the element that causes firescale to form when copper alloys are heated, it follows the same theory that it should also protect gems that are sensitive to oxygen.

Copper-based bronze and copper clays are buried in activated carbon during firing to avoid the creation of firescale that is difficult to remove from the surface of the fired metal. Firescale is created when copper is heated in the presence of oxygen.

It is important to remember that some stones can only be embedded in low-temperature fire clays. If you wanted a very strong product or wanted to use a clay that required a 2-4 hour firing, choose an appropriate gemstone or set the stone after firing.

Firing a Carbon-Safe Stone in Bronze or Copper Clay

Most cubic zirconia and lab gemstones can be fired in carbon. Firing gemstones in copper-bearing clays is very simple. Embed your chosen stone in your bronze or copper clay, dry and fire as usual in activated carbon. The carbon ***adsorbs** oxygen during firing, and the lack of oxygen protects the stone from burning. Any stone marked as Carbon-Safe is oxygen-sensitive, but can be safely fired if embedded and protected by activated carbon.

Firing a Carbon-Safe Stone in Silver Clays

With this technique, you can safely fire most CZ's and Lab gemstones in all forms of silver clay at the ideal temperature without sacrificing the stone or the integrity of the final product.

Note: OneFire PMC 950 Sterling and other similar sterling clays require carbon firing **only** if the gemstone that you are embedding requires carbon firing.

***Carbon is an adsorbent. Adsorb is a process where liquid or gas is not absorbed but forms on the surface.**

Nano Gems

Sterling and Silver Clay

Nano Gems are safe to fire up to 913°C on an open shelf in sterling and fine silver clays, with the exception of the Dark Orange and Orange, which can safely be fired up to 899°C on an open shelf in sterling and fine silver clays.

Base Metal Clay

There is a chance that Nano gems may change colour when used with base metal clays. We recommend testing Nano Gems with your chosen base metal clay prior to the creation of your final piece.

Please note: It is very important to fire Nano Gems with a hole (or azure) behind the gem for light to pass through. Without the hole which is called an azure, Nano gems can change colour, look muddy or lose their lustre.

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Agate (Cameo)	Quartz	7	X					
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Alexandrite Cats Eye **	Chrisoberyl	8.5		899°C	2 Hrs		F	F
Almandine Garnet	Garnet	6.5 - 7.5		849°C	30 Min		F	F
Amazonite	Feldspar	6 - 6.5		649°C	30 Min		F	F
Amethyst	Quartz	7	X					
Aquamarine	Beryl	7.5 - 8	X					
Aventurine	Quartz	7	X					
Black Onyx	Quartz	7	X					
Black Star Sapphire	Corundum	9		899°C	2 Hrs		F	F
Carnelian	Quartz	7	X					
Chalcedony	Quartz	7	X					
Chrome Diopside	Pyroxene	5 - 6		649°C	30 Min		F	
Citrine	Quartz	7	X					
Demantoid Garnet	Garnet	6.5 - 7.5		849°C	30 Min		F	F
Diamond	Diamond	10	X					
Emerald	Beryl	7.5 - 8	X					
Fire Opal	Silicate	6 - 6.5	X					
Hematite	Iron Mineral	5.5 - 6.5		899°C	2 Hrs		F	F
Iolite	Iolite	7 - 7.5	X					
Jadeite	Quartz	5 - 6	X					
Labradorite	Feldspar	6 - 6.5		649°C	30 Min		F	
Lapis - Denim	Rock	5.5	F					
Lapis Luzuli	Rock	5.5	F					
Malachite	Borate	3.5 - 4	F					
Moonstone - Grey	Feldspar	6 - 6.5		649°C	30 Min		F	
Moonstone - Peach	Feldspar	6 - 6.5		599°C	30 Min		F	
Moonstone - White	Feldspar	6 - 6.5		599°C	30 Min		F	

**(hydrothermal grown)