



Fig 3 Created by combining through bands of NS-03 Multi, NS-21 Moss, NS-53 Forest Green, and NS-68 Parrot Green, layered on a solid backing of NS-58 Mint. The sculptural stem and stopper were made with NS-78 Mystery Aventurine.

WORKING NORTHSTAR COLORS

By Jesse Kohl

As a borosilicate lampworker one of the most unique and inspiring facets of the medium is the color palette. With the myriad of combinations and distinct working properties, even the wildest imagination can be sated with the possibilities these colors offer. To fully utilize the palette, one must pay close attention to the many factors that determine the resultant color and understand how each member of the color family interacts with other colors. To master the borosilicate palette is not difficult, but is a road of experimentation, patience, and

careful observation. Once you gather this knowledge, your ability to select and combine colors successfully to express your vision will become second nature. To assist you in this journey, here is a basic guide to working Northstar borosilicate glass and a few inspirational tips.

The cobalt family consists of NS-01 Cobalt, NS-19 Light Cobalt, NS-20 Dark Cobalt, and NS-33 Turbo Cobalt. With any cobalt blue, the higher chemically saturated the glass is, the darker it becomes and the more easily it is reduced. The two lighter cobalt blues, NS-01 Cobalt and NS-19 Light Cobalt, are well suited for sculpture and overlays as they are not affected by flame atmosphere. The darker cobalts, NS-20 Dark Cobalt and NS-33 Turbo Cobalt, are well suited for stringer application and surface work but are affected by a reductive atmosphere. NS-20 Dark Cobalt can be worked in a neutral to oxidizing flame without the color changing though a heavily reductive flame will create hints of graying on the surface making it appear to have a dull matte finish or film that clouds the glass. For NS-33

Turbo Cobalt, working in a heavily oxidizing flame is crucial to maintain the original color of the rod; a deep faux black. If worked in a neutral to reducing flame there will be streaks of gray that form on the surface.

The next family that makes up additional foundation colors of the palette is the opaque family. Consisting of NS-54 Star White, NS-55 Periwinkle, NS-57 Midnight, NS-58 Mint, NS-62 Bubblegum, and NS-80 Hyacinth, this family's smooth working properties and stable coefficient of expansion help them play an integral role in many applications. They are well suited for inside-out work, thin blown vessels (with the exception of NS-58 Mint and NS-62 Bubblegum), and as background colors for sculptural work (marbles and beads). To achieve a smooth creamy texture with the colors in this palette, the general rule of thumb is to start by heating the color up slowly. Any air trapped in the glass will gently rise to the surface and escape. If heated too quickly, the small quantity of air that is trapped in the rod will expand rapidly causing a pitted surface to form on the color. Once the color is heated and smoothed out it can withstand a large volume of heat. Use care when fire cutting or thinning the rod because it will absorb more heat and cause a rough spot.



This Suellen Fowler style miniature was created using re-mixed NS-69 Green Amber/Purple with re-mixed NS-05 Orange as surface decoration. The base was made with NS-69 Green Amber/Purple. Note the vibrant pastel effect that is created by re-mixing the colors.

Another option to yield a super-smooth color is to re-mix the color rod just as Suellen Fowler does. By taking the rod and collapsing it into a solid marble of color, smoothing it out by drill mixing, and re-pulling the blob of color into a rod, the color is refined.

An offshoot of the opaque family that has different working properties is made up of NS-11 Jade, NS-52 Teal, reformulated NS-53 Forest Green, reformulated NS-61 Blackberry, NS-73 Millennium Moss, NS-74 Transparent Millennium Moss, NS-75 Indigo Aventurine, and NS-76 Onyx. All colors in this group are atmospherically stable (excluding Millennium Moss which develops red streaks when reduced). All can be subjected to a wide array of flames and worked in many different flame settings and applications. NS-11 Jade, NS-73 Millennium Moss, and NS-74 Transparent Millennium Moss can pose C.O.E. issues and are not recommended in heavy encased work.

Another group of opaque colors that possess yet another set of working properties are the faux blacks, NS-16 Black and NS-35 Black Hole. Both are susceptible to reduction and are limited in intensity. The darker of the two, NS-35 Black Hole, is suitable for stringers and thin work.

The transparent color family is another that offers fascinating possibilities. Though best suited for sculpture, this palette is an excellent candidate for utilizing as an overlay color and one that can be mixed with other colors in the palette. The colors that are included in this family are NS-23 Pink, NS-25 Peach, NS-31 Lavender, and NS-32 Violet, and NS-66 Sublime. The properties of these colors lend themselves to be worked very easily in the flame. They are atmospherically stable and can be worked in any flame setting without the color being changed in any way. Offshoots of the group are the colors NS-24 Transparent Green, NS-70 Ice Blue, and NS-73 Glacier Blue. Though these colors share similar intensities, when reduced these colors darken and develop red streaks. NS-70 Ice Blue and NS-72 Glacier Blue are especially prone to reduction.

The wide varieties of striking colors that Northstar has developed require special attention. The first group that is the most easily utilized is comprised of NS-03 Multi, NS-04 Dark Multi, NS-09 Yellow, NS-14 Irrid, NS-15 Turquesa, NS-34 Extra Light Yellow, and NS-38 Blue Green. This group of medium and light intensity colors is easily worked without fear of boiling or C.O.E. issues. NS-14 Irrid, NS-15 Turquesa, and NS-38 Blue Green's final color is dictated by the oxidation state of the flame: oxidize for metallic blues and reduce for sea greens. For NS-09 Yellow and NS-34 Extra Light Yellow, strike by reheating after cooling, oxidizing for a transparent yellow and reducing for hazy blues. NS-03 Multi and NS-04 Dark Multi yield metallic blues and greens when oxidized and reds and earthy browns when reduced. Overall, this group is well suited for overlay and sculpture.

Another category of striking colors consists of NS-41 Butterscotch, NS-44 Caramel, NS-45 Blue Moon, and NS-81 Blue Caramel. This family is well suited for stringer applications and use as an opaque backing due to their intensity. Because these colors are more heavily saturated they require a more oxidizing hot flame to control. NS-41 Butterscotch and NS-44 Caramel both yield more metallic hues when oxidized and more buttery pastels with hints of purple when reduced. NS-45 Blue Moon produces deep metallic hues when oxidized and a dark battleship gray when reduced. NS-81 Blue Caramel is the newest member of the family and yields metallic hues whether reduced or oxidized. This color works well encased.

The most saturated of the striking color family consists of NS-27 Green Exotic, NS-28 Blue Exotic, NS-29 Red Exotic, and NS-47 Aurora. This family is well suited for sculpture and highlights. Due to the saturation these colors have a slightly higher C.O.E. and should not be heavily encased. If you are daring and do heavily encase, be sure to run a thorough annealing cycle to have the best chance for survival. To achieve the most vibrant range of effects use a strong oxidizing flame and encase in clear. The effects range from a metal fume appearance, to a mirror-like sheen, as well as others depending on how the color is applied and worked. Achieving a metal fume effect may be done several ways. One method is to reduce the piece slightly just before you are finished. The other is to reduce the rod and then coat it with clear glass. NS-47 Aurora is the most versatile in the family as well as the least prone to C.O.E. issues. With NS-47 Aurora it is possible to get a full spectrum of colors depending on which flame is used as well as whether the piece is encased in clear or a color. To achieve vibrant blues, try working it in a highly oxidizing flame. For greens, work it in a neutral flame and to generate vibrant deep reds, work the piece in a neutral flame then reduce the piece when it is close to completion.



This vessel was created by layering NS-07 Ruby over NS-54 Star White. The vessel was striped with NS-09 Yellow and flame struck using a Bunsen burner. The sculptural stem was created by brushing on stripes of NS-07 Ruby over NS-54 Star White.

One of the most challenging groups of color to work is the Ruby family. This group consists of NS-05 Orange, NS-06 Dark Orange, NS-07L Light Ruby, NS-07 Ruby, NS-08 Dark Ruby, NS-37 Rootbeer, NS-43 Rust, and NS-59 Cranberry. When working with ruby glass, do so in a neutral to slightly oxidizing flame. For rubies, the easiest way to uniformly strike them is in an electric oven. Recommended striking temperature is 1050 F or 560 C. A higher annealing temperature will strike the color more quickly than a slightly lower annealing temperature, though a cooler, slower, longer strike is better for the color. Rubies can be struck in the flame by slowly reheating the piece with an oxidizing flame if needed.

Each of the rubies in this family is designed for a different purpose and has a slightly different strike rate. The key to achieving a brilliant ruby is to work it as hot as possible (without boiling) so that the ruby returns to the un-struck state (clear), and then re-strike it in an oven. While striking, keep an eye on the piece so it does not darken more than desired (if you have a digital controller, you can set it to hold for a specific time period). The general rule is that the darker and more saturated colors will strike more quickly. NS-07L Light Ruby is designed for kiln striking and can be worked for long periods of time and as a result may be difficult to flame strike. While NS-07 Ruby can be flame or kiln struck, it can become livery if struck too hot and/or for too long. NS-08 Dark Ruby is the ideal red for stringers because it holds its intensity when thinned. It can be flame or kiln struck, but because of its intensity, over striking can be an issue (to minimize over striking, check the glass periodically during the striking process). NS-43 Rust can be struck in a similar manner as can NS-59 Cranberry. NS-37 Rootbeer offers more variables and can strike to a deep brown with

metallic red highlights (note, it is susceptible to reduction).

In my opinion the most fascinating color family is the Amber/Purple Family. This group offers the most diverse and exciting color spectrum. This family is made up of NS-13 Amber/Purple, NS-26 Double Amber/Purple, NS-48 Light Blue Amber/Purple, NS-49 Dark Blue Amber/Purple, and NS-69 Green Amber/Purple. To yield the optimum purple strike from this color family, work in a hot oxidizing flame and burn off the haze. The term haze refers to the thin layer of reduced silver that is deposited on the surface of the Amber/Purple. To burn this layer off use a hot pushing flame to vaporize the metal film. By doing so, the vibrant true color of the Amber/Purple is exposed. To strike the Amber/Purple gently reheat or place in a kiln in the un-struck state and hold until the desired shade is reached. It is important to burn the haze off quickly after the color is applied. With NS-69 Green Amber/Purple it is crucial to do so or else some haze will remain.

As can be seen in this brief article there are a lot of techniques and tricks to fully work colored borosilicate. By no means is this article a complete guide so I implore you to view our past newsletters at www.northstarglass.com and explore further publications on use of color. Take special note of the photos within the article as there are a few inspirational ideas that encapsulate some fascinating effects that can be created with the Northstar borosilicate palette. If you have any questions pertaining to use of colored borosilicate glass we offer full tech support and advice! Call us toll free (866) 684-6986. If you would like to email me personally send your questions to jkmeck@teleport.com. Calendar of Events

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