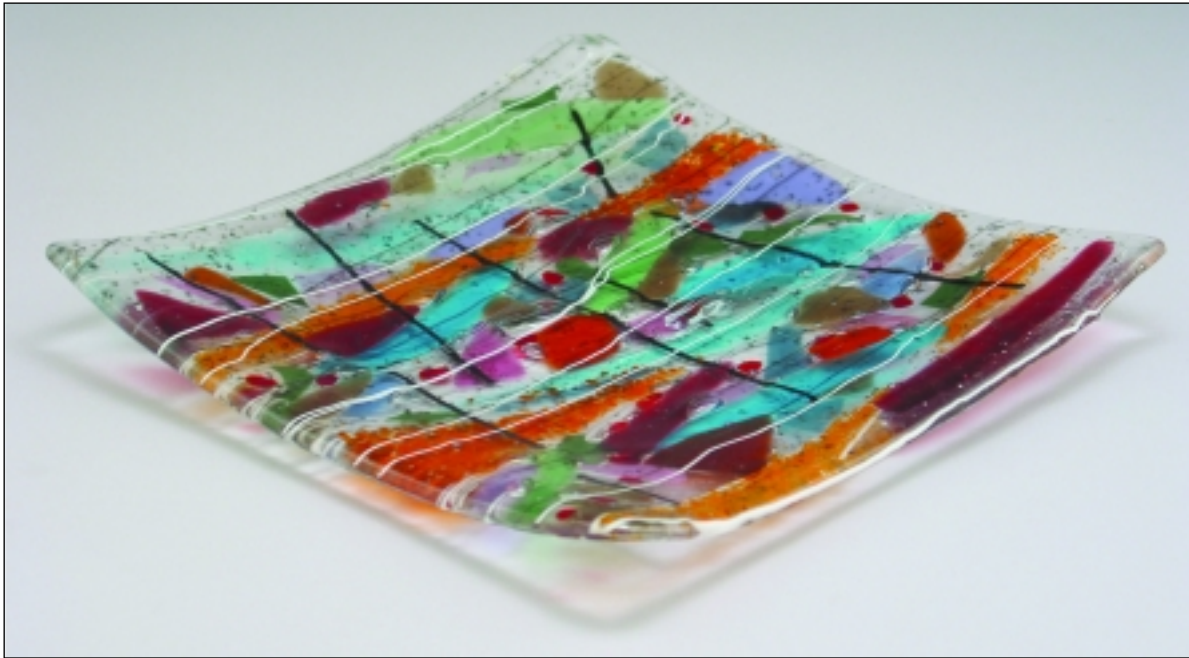


# ***Warm Glass Renaissance***



## **Lesson #18**

### **Modern Technology Brings Back an Ancient Glass Art Form with Amaco Glass Select Fire Kilns.**



Contemporary glass art is reviving an ancient glass medium. Warm glass, which is commonly known as glass fusing or slumping, is an ancient artistic technique. Historians have found traces of both methods dating back to the second millennium BC in Mesopotamia. Glass mosaics, valued in Greek and Roman civilizations, were considered equal to silver and gold as precious materials. By the third century AD warm glass fell out of favor, eclipsed by a new blown glass technique. It was not until the emergence of the European Arts and Crafts movement, in the late nineteenth century, that warm glass was revalued as a decorative art form. Today, contemporary artisans have rediscovered these ancient techniques. Popularity of warm glass is being fueled by current trends in design and by the ease of modern kilns such as the AMACO/EXCEL Glass Select Models.

The following simple instructions for AMACO/EXCEL Warm Glass Kilns, along with an introductory project, will lead you through basic terms and materials associated with contemporary warm glass techniques.

# Supplies and Tools:

- Colored frits, shown in tubes
- Small confetti glass pieces
- Fusible glass sheets (1.6mm/3mm)
- Grozing pliers to trim edges
- Pistol grip pliers for scoring
- Amaco Kiln Wash, 1 lb. jar (catalog #24145W)
- Colored threads and stringers
- Glass pliers to snap glass apart
- Fiberboard or 12" x 12" carpet square
- Slip cast slump mold (17 5/8" square)
- Ruler
- Amaco® Excel® Glass SelectFire™ Kiln (catalog #24145W)



# Glossary of Terms:

**Composition** — The organization of form in a work of art; the disposition of the shapes, masses, areas of light and dark, etc.

**Confetti** — Paper-thin shards of glass that can be arranged in random forms.

**Fire** — A term used in warm glass; to heat the glass in a kiln at a very high temperature in order to fuse, tack or slump.

**Frits** — Colored crushed glass varying in size and thickness that when fused to another piece of glass enhances a composition.

**Full Fuse** — The joining of two or more pieces of glass by heating until they flow together. This is done in a kiln at a temperature range of 1480°F. The thickness and type of glass will affect the speed at which this occurs. Refer to the AMACO/Excel GSF-045 and GSF-670 operating manuals, page 9, for Slow, Medium, or Fast settings.

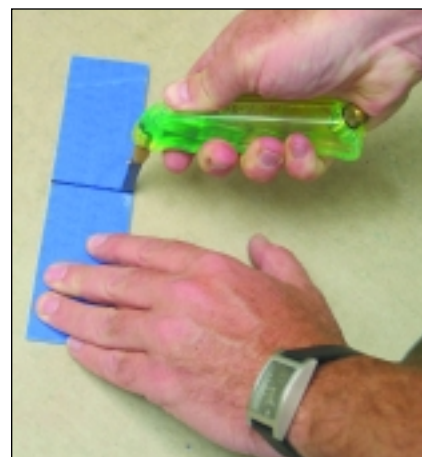
**Mold** — A ceramic kiln shape over which glass is given form. In this lesson a 12"x12" square ceramic mold is used.

**Slumping** — The shaping of a finished glass piece by laying it over or onto a mold and heating inside a kiln. This is done at a temperature range of 1220°F. The thickness and type of glass will affect the speed at which this occurs. Refer to the AMACO/Excel GSF-045 and GSF-670 operating manuals, page 9, for Slow, Medium, or Fast settings.

**Threads/ Stringers** — Very thin colored glass rods 3/64 inches in diameter.

**Warm Glass** — A term referring to the process of joining two or more pieces of glass by applying heat in order to soften the glass to a state appropriate to fuse, tack or slump.

This project leads you through fusing and slumping. Tacking is different in that it joins glass by a higher temperature. For tack fuse firing, refer to the AMACO/Excel GSF-670 and GSF-045 manuals.



Score glass with a pistol grip cutter.



Cut and snap glass sheets apart with glass pliers.

<b>Fast</b>	1/8" Thick - 18" diameter or smaller
	1/4" Thick - 4" diameter or smaller
	3/8" Thick - Not Recommended
<b>Medium</b>	1/8" Thick - 20" diameter or smaller
	1/4" Thick - 8" diameter or smaller
	3/8" Thick - 5" diameter or smaller
<b>Slow</b>	1/8" Thick - 24" diameter or smaller
	1/4" Thick - 18" diameter or smaller
	3/8" Thick - 12" diameter or smaller
	1/2" Thick - 8" diameter or smaller



Compose a design on the base glass by arranging colored frits, threads and confetti.



An optional step involves laying a larger size glass sheet over the base sheet.

## Basic Instructions For Contemporary Glass:

The composition of contemporary designs can be easily made by the random arrangement of chosen elements. The following project involves experimentation with 1.6mm and 3mm glass sheets with full fusing and slumping techniques. Firing programs for full fusing, tack fusing and slumping are made up of heating/cooling segments, where glass is heated, then cooled to produce a variety of effects for different thicknesses of glass. The firing program for all methods takes approximately 18 hours; each program consists of 8 segments, cool/heat/cool. Tack fusing produces a relief-like surface accomplished by firing at a higher temperature. For tack fusing programs, refer to the AMACO/Excel GSF-670 and GSF-045 manuals. For full fusing and slumping methods, follow these steps. Slumping will require a second 18-hour firing.

## Full Fuse Glass Method:

1. Using fiberboard or a carpet square for your work surface, choose an assortment of colored fusible sheet glass, threads and confetti to create a simple composition.
2. Choose a primary base piece or bottom piece of glass. All other glass will lie on top of this piece. (Begin with a small piece to experiment with until you get comfortable with the process.)

3. Score and cut/break the base piece to the size and shape you want. This is easier than it sounds. Take your pistol grip cutter and press firmly down on a predetermined line on the smooth side of the glass, and push away from yourself. Then using glass pliers, line up the arrow on the pliers with the score, and apply pressure to the grip. The glass should snap along the scored line.
4. Score and cut smaller pieces of colored glass and arrange a composition on top of the base piece. Enhance the design with threads, confetti and frits. Use a small amount of white glue that has already been thinned down (50% water/50% glue) to secure small pieces to the base. Then use grozing pliers to trim off any glass spurs that detract from a smooth edge.

5. Optional Step: Score and cut a top piece 1/8" larger than the base piece and place it on top of your completed glass design. This piece is usually a clear piece so that your design shows through after being fused or slumped.

6. Apply three even coats of AMACO Kiln Wash to kiln shelf. Allow each coat to dry.

7. Place your "glass" piece on the kiln shelf inside the kiln. Close the lid and program the "Glass Select Fire" control for "Fuse" mode. Refer to the AMACO/Excel GSF-045 and GSF-670 operating manuals, page 9, for Slow, Medium, or Fast settings. Or use the chart on page 2.

## Slumping or "Slump" Glass Method:

1-6. Follow the Fused Glass instructions to completion.

7. Then select a mold shape that you will set the "fused glass" on. This will be the shape or form your final warm glass piece will take.

8. Apply three even coats of AMACO Kiln Wash to the mold. Allow each coat to dry.

9. Place the mold inside the Glass Kiln and set the fused glass piece on top of the mold so that all sides are even with circumference of the shape.

10. Close the lid and program the "Glass Select Fire" control for "slump" mode. Refer to the AMACO/Excel GSF-045 and GSF-670 operating manuals, page 9, for Slow, Medium, or Fast settings. Or use the chart on page 2.



Slumping glass, by placing an already full fused piece over a mold, then firing again, creates a shaped vessel.

## Finishing Touches/Clean Up:

Your finished piece may have rough edges and/or kiln wash stuck to the underside. Rinse the kiln wash off with water. For any edges that might appear too rough, use varying grades of sand paper to smooth down edges.



## Full Fuse Programs

Full Fuse - SLOW	1	2	3	4	5	6	7	8
Rate (°F/HR)	300	300	300	600	600	9999	30	60
Temperature (°F)	250	500	750	1250	1480	1000	970	750
Hold Time (HR.Min)	00.25	00.25	00.25	00.20	00.15	02.00	02.00	00.01

Full Fuse - MED	1	2	3	4	5	6	7	8
Rate (°F/HR)	500	500	500	600	600	9999	90	1200
Temperature (°F)	250	500	750	1250	1480	1000	970	750
Hold Time (HR.Min)	00.12	00.12	00.12	00.20	00.15	01.00	01.00	00.01

Full Fuse - FAST	1	2	3	4	5	6	7	8
Rate (°F/HR)	800	800	800	600	600	9999	200	200
Temperature (°F)	250	500	750	1250	1480	1000	975	750
Hold Time (HR.Min)	00.05	00.05	00.05	00.20	00.15	00.10	00.20	00.01

## Slumping Programs

Slump - SLOW	1	2	3	4	5	6	7	8
Rate (°F/HR)	300	300	300	600	600	9999	30	60
Temperature (°F)	250	500	750	1150	1220	1000	970	750
Hold Time (HR.Min)	00.25	00.25	00.25	00.05	00.05	02.00	02.00	00.01

Slump - MED	1	2	3	4	5	6	7	8
Rate (°F/HR)	500	500	500	600	600	9999	90	120
Temperature (°F)	250	500	750	1100	1220	1000	970	750
Hold Time (HR.Min)	00.12	00.12	00.12	00.05	00.05	01.00	01.00	00.01

Slump - FAST	1	2	3	4	5	6	7	8
Rate (°F/HR)	800	800	800	600	600	9999	200	200
Temperature (°F)	250	500	750	1100	1220	1000	975	750
Hold Time (HR.Min)	00.05	00.05	00.05	00.05	00.05	00.10	00.20	00.01

### GSF-670

#### Glass Select Fire Warm Glass Kiln

- Cone 07
- GSF controller for precision & versatility
- Extra tall firing chamber 6.72 cubic feet
- Also available, the smaller GSF-045 model (0.4 cubic feet of firing space) with GSF controller for accuracy and stability. Runs on household current.

*Lesson Plan #18 was written by Jeff Sandoe and is one in a series of art plans for elementary and secondary programs using American Art Clay Co., Inc. products. Successful lessons will be considered for future publication. Send your ideas and slides to David Gamble, Vice President, Director of Marketing and Education — Brent and Educational Divisions, American Art Clay Co., Inc., 6060 Guion Rd., Indianapolis, Indiana 46254.*



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