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Understanding Firing Schedules

Every kiln records temperature slightly different and every make of glass behaves differently in the kiln. An approximate temperature level to produce different effects for COE 96 glass is:

0 - 1000°F (535C) Thermal shock range.
The range at which thermal shock can occur. Once the glass is heated to above 1000° there is no longer a fear it will crack.

1200°F (650C) to 1250°F (675C)Slump.
The glass will become soft enough to sag and can be slumped or draped into or over a mold.

1300°F (705C) to 1325°F (720C) Fire Polish
The glass edges will soften and polish.

1350°F (730C) to 1375°F (745C) Tack Fuse
Two pieces of glass in contact with each other will fuse together. They will become permanently attached to each other, with softened but only slightly rounded edge.

1400°F (760C) to 1425°F (775C) Contour Fuse
Fused together pieces of glass will partially melt together into gentle curved cap.

1450°F (790C) to 1475°F (800C) Full Fuse
The glass will have flowed together into a single common level.

You might at first think firing schedules are too difficult to figure out yourself. They're not. Each segment is for a specific reason to perform a specific function. If you change what you're doing, you will change what needs to be done, so you therefore must use a different firing schedule. A kiln firing schedule that works for a small thin piece of glass won't work for a large thick piece of glass. A firing schedule up to 1200° to slump glass won't be hot enough to fuse it. A program up to 1400° will just make a mess if you're trying to slump it. Everything that's done is done for a specific reason. If you understand what the reasons are, you'll understand how to vary your firing schedules.

Here's a typical simple 5 segment firing schedule for 2 layers of glass to be fired to a full fuse with a bubble squeeze included:

Segment	***Rate*** (° /hr)	***Temp*** ° F (C)	***Hold*** Minutes
1.	400F (200C)	1000F (595C)	20
2.	200F (95C)	1150F (620C)	20
3.	900F (500C)	1460F (795C)	20
4.	AFAP	960F (515C)	60
5.	200F (95C)	800F (425C)	10
6.	400F (200C)	300F (150C)	0

Segment 1 RAMP UP
Temperature increased at 400°F (200C) per hour to allow the glass to absorb the heat evenly to avoid cracking from thermal shock. Thin glass and small pieces can be ramped up quickly. Thick glass must be ramped up much slower (perhaps as slow as 100° per hour). If you're not confident how fast is safe, go slow. Going too fast will crack the glass. Going too slow just takes longer.

Segment 1 HOLD to equalize
The temperature is held at 1000°F (595C) for 20 minutes to allow the heat to soak entirely into the glass.

Segment 2 RAMP UP
Temperature increased at 200°F (95C) per hour up to 1150°F (620C) to allow the glass to soften slowly to just below slump temperature.

Segment 2 HOLD for bubble squeeze
Temperature is held at 1150°F (620C) to allow the escape of any air that might be trapped between the layers of glass or between the bottom glass and the kiln shelf. It's soaked at this temperature because it's not yet hot enough for the glass so slump.

Segment 3 RAMP UP
Because there's no longer a risk of thermal shock, the temperature can be brought up rapidly to the top level.

Segment 3 HOLD for performance
Temperature is held at the top level for however long is needed to produce the desired effect.

Segment 4 RAMP DOWN to anneal
Temperature is now dropped as fast as possible to reduce the risk of devitrification.

Segment 4 HOLD for annealling
Temperature is held long enough for the glass to anneal.

Segment 5 RAMP DOWN to strain point
Temperature is held long enough to release residual stress in the glass.

Segment 6 RAMP DOWN to off
Temperate is now dropped to room temperature at a rate slow enough to avoid thermal shock.