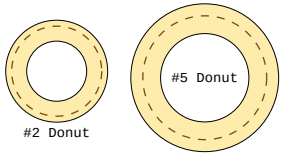
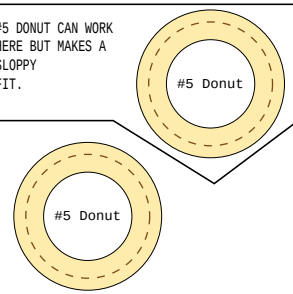
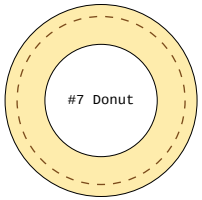
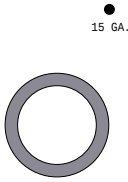
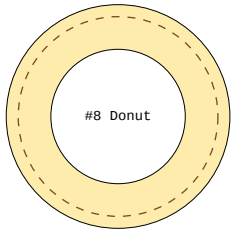
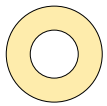
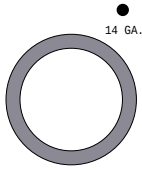
All items can be purchased from Joppa Glassworks, Inc.

The Donut Chart

Use either external support or internal support, not both.

EXTERNAL SUPPORT	INTERNAL SUPPORT	WIRE DIAMETER	ELEMENT COIL	ARBOR SIZE	Example of Typical Element Wound on Arbor Size
This donut is made using 3/8" x 1/4" mulite tubing and a diamond saw. See details on page 110 of *A Glassblower's Companion.* 					© 2004 Joppa Glassworks, Inc., and Dudley Giberson all rights reserved. PO Box 202, Warner, NH 03278 Phone 603-456-3569 Fax 603-456-2138 e-mail: joppaglass@conknet.com
FUSED SILICA TUBE  USE WITH #5 DONUT	FUSED SILICA ROD  4mm USE WITH #1 DONUT	22 GA.		#3	**E000-00-223** Element is made with 22 gauge wire on the #3 arbor. Typical application is for small elements (500-900 watts) for small kilns and heaters. There is a good explanation of this mini element on pages 111-112 in my book, ***A Glassblower's Companion.***
		22 ○ **20** ● 18 ○ 16 ○ 15 ○ 14 ○		#3	**E000-00-203** Element is made with 20 gauge wire on the #3 arbor. This element should be mounted in one of two ways: 1. Encase element in a fused silica tube and hang using #5 donuts. Or 2. Mount element using #2 donuts with internal support of 4mm fused silica. Method 1 makes an electrically protected element and is the preferred mounting technique. Method 1 is the stronger of the two systems.
FUSED SILICA TUBE RECOMMENDED METHOD  USE WITH #5 DONUT	FUSED SILICA ROD CAN BE USED BUT NOT HIGHLY RECOMMENDED  4mm USE WITH #2 DONUT	22 ● **20** ● **18** ● 16 ● 15 ○ 14 ○		#3	**E000-00-183** Element is made with 18 gauge wire on the #3 arbor. This is an even beefier version over the 22 and 20 gauge models above. Use this element configuration for 120 or 240 VAC coils. For some small heaters this represents a heavy duty solution. The element fits nicely within the fused quartz tubing and is hung using the #5 donuts. This makes an electrically insulated element often preferred and requested by beadmakers.
#5 DONUT CAN WORK HERE BUT MAKES A SLOPPY FIT. 		FUSED SILICA ROD OK FOR ELEMENT SUPPORT  5mm USE WITH #5 DONUT	20 ● **18** ● 16 ● 15 ●		#4	**E000-00-184** This sample element is made with 18 gauge wire on the #4 arbor. This configuration is used with grooved brick construction in kilns, enamelist kilns, and small annealers. Element is often pinned into IFB Grooved Brick. The #5 donut will work to hang element, but it makes a sloppy fit. We also wind other gauges on this arbor.
		 .25"MUL	22 ● 20 ● 18 ● **16** ● 15 ● 14 ●		#5	**E000-00-165** Element is made with 16 gauge wire on the #5 arbor. This is the standard element for most annealer kilns that use the donut support system. The #5 donut if placed every 6-8" along a wall will adequately provide stability. If you are heating to temperatures above annealing we recommend you include internal support to keep the elements from sagging. Our most popular element is the E240-14-165 used in countless kilns all over the world. **We can wind all gauges on this arbor.**
Chart Key ◎ Element coil, size ■ Metal cross-section □ Fused Silica ▭ Cordierite Ceramic ▨ Mulite or Al2O3		FUSED SILICA ROD  5mm THIS CAN HELP HOLD THE ELEMENT IN ITS GROOVE	22 ● 20 ● 18 ● **16** ● 15 ● 14 ●		#6	**E000-00-166** Element is made with 16 ga wire on the #6 Arbor. The E240-14-166 is our standard element for grooved brick construction. The open configuration helps dissipate the heat from the element to the kiln atmosphere. Occasionally a customer will wish to put stabilizing rods in the center of the element to restrain the element to the groove. Use 5mm fused silica rods. This clear material does not hold in the heat as would an opaque mulite rod. **We can wind all gauges on this arbor.**
		 .375" COR.	22 ● 20 ● 18 ● 16 ● **15** ● 14 ●		#7	**E000-00-157** Element is made with 15 ga wire on the #7 Arbor. This is a heavy duty element. But this must be engineered correctly or you will be wasting your money. When using the heavier gauge element wire there must be enough space for the coils to expand or stretch so the coils are separated by at least 1/4 inch and preferably more. This element works great on the large #7 cordierite rods supported by the #7 donuts. Of course the same support system will work for elements made of other gauges of wire. Elements of this size are seldom placed in protective fused silica tubing. It is more practical to arrange a lid shut off switch to cut power when open.
		 .5" COR.	22 ● 20 ● 18 ● 16 ● 15 ● **14** ●		#8	**E000-00-148** Example shows element made with 14 gauge wire on the #8 arbor which is the largest gauge wire we wind configured to fit the largest hardware. More frequently we use this #8 kiln furniture for hanging the 16 and 15 gauge elements like the E240-14-168 or the E120-12-158 as an example. There is a temperature limit on the element furniture made of cordierite. We recommend no higher than 2000˚F. Though the most common use for this size furniture is for 15 and 16 gauge elements installed in large 50 to 100 cubic foot slumpers and fusers, it is also used in speciality situations to put a lot of wire in a small space, which it does very economically. This beefy construction says with confidence- "built to last."

If you need help using this information please feel free to call and discuss our solutions: Dudley Giberson at 603-456-3569