

## Resistors

### R400H

#### Low Range Ohmic Resistor Paste

**Description:**

Heraeus' R400H Series is a low range, low TCR air-fired resistor system, compatible with Pt/Ag and Pd/Ag conductors. This series gives a dense fired film and was designed to give very tight resistance distribution when cofiring the front and back side of circuits. The series exhibits excellent print resolution for use in typical serpentine layouts. Heraeus' R400H Series is laser trimmable, has outstanding power handling capability and pulse stability.

● **Key Benefits:**

- Low range ohmic resistor
- Low TCRs
- Dense microstructure to allow excellent high voltage pulse stability
- Tight as fired distribution

● **Typical Properties:**

	R405H	R409H	R410H	R415H	R425H	R450H	R475H	R490H	R400H-05	R400H-10
<b>Resistance millionhms/sq. *</b>	50 ± 20%	90 ± 10%	100 ± 10%	150 ± 10%	250 ± 10%	500 ± 10%	750 ± 10%	1000 ± 15%	5000 ± 15%	10,000± 15%
<b>TCR (ppm)</b>	<400	<100	<100	<75	<75	<75	<75	<75	<75	<75
<b>Refire Stability</b>										
<b>ΔR @ 500°C</b>	<1%	<1%	<1%	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>ΔR @ 850°C</b>	<-3%	<-3%	<-3%	<-3%	<-3%	<-4%	<-4%	<-4%	<-4%	<-5%
<b>Pulse Stability*</b>										
<b>ΔR @ 1000V</b>	<-0.2%	<-0.2%	<-0.2%	<-0.2%	0%	0%	0%	0%	0%	N/A
<b>ΔR @ 2500V</b>	<-0.3%	<-0.3%	<-0.3%	<-0.3%	<-0.2%	0%	0%	0%	0%	N/A

\*Measured on a 620 square serpentine pattern, 25 mil lines and spaces. Pulse stability testing was done using 40 pulses, overglazed with IP9117.

Peak voltage Vp	Rise time Tr	Fall time to half of the peak voltage Tf
1000 V	10μs	1000μs
2500 V	2μs	10μs

**Viscosity:** 180-260 Kcps - Brookfield HBT SC4-14 spindle, and 6R utility cup, 10 rpm @ 25°C.

**Solids:** R405H, R409H and R410H = 77 ± 1%  
All other values = 70 ± 1%

Recommended 850°C overglaze - IP9117S  
Recommended Termination Conductor - C4740S, C1003  
Recommended Marking Ink - IP9203

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- **Recommended Processing Guidelines:**

**Printing**

**Conditions:** 250-325 mesh, 1.1 mil wire and 0.5 mil emulsion screen

**Drying**

**Conditions:** Dry at 150°C for 8-10 minutes

**Firing**

**Conditions:** Fire at 850°C peak with a 10 minute dwell time.

- **Thickness Information:**  
(microns)

	R405H	R409H	R410H	R415H	R425H	R450H	R475H	R490H	R400H-05	R400H-10
Dry	12-19	20-22	17-21	14-17	14-16	15-17	15-17	15-17	14-17	14-17
Fired	7-11	10-12	9-11.5	7-9	7-8.5	8-10	8.5-10.5	8.5-10.5	8.5-10.5	8.5-10.5

**Coverage Information:**  
(cm<sup>2</sup>/gm)

	R410H	R425H	R450H	R490H
Recommended FFT	108@12um	157@7um	167@10um	115@8um

**Warranty:**

Material guaranteed to meet specifications for 6 months from date of shipment.

**Storage:**

Store in a dry location at 5°C -25°C.

**DO NOT REFRIGERATE.**

Allow paste to come to room temperature prior to opening.

Spatulate well before using.

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The descriptions and engineering data shown here have been compiled by Heraeus using commonly-accepted procedures, in conjunction with modern testing equipment, and have been compiled as according to the latest factual knowledge in our possession. The information was up-to date on the date this document was printed (latest versions can always be supplied upon request). Although the data is considered accurate, we cannot guarantee accuracy, the results obtained from its use, or any patent infringement resulting from its use (unless this is contractually and explicitly agreed in writing, in advance). The data is supplied on the condition that the user shall conduct tests to determine materials suitability for a particular application.

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