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R-300-A/B Resistor Series

Tolerant to Processing and Design Variations

Excellent Printing Characteristics

Low TCR's

High Performance

Low Cost

The ESL R-300-A and R-300-B Resistor Series are economical, high performance materials for the manufacture of hybrid circuits and resistors networks. Features of the ESL R-300-A and R-300-B Series include excellent printability and low sensitivity to processing conditions.

The dependence of resistance and TCR on blending follows the usual curves for resistor materials. Adjacent members of the Series can be blended. The R-300-A Series members can not be blended with members of the R-300-B Series.

The resistors are calibrated with ESL 9693-S PdAg conductor terminations. Other silver-based and gold-based conductors can be used; however, TCR and resistivity shifts may be observed.

R-300-A/B 9910-F

ESL Affiliates

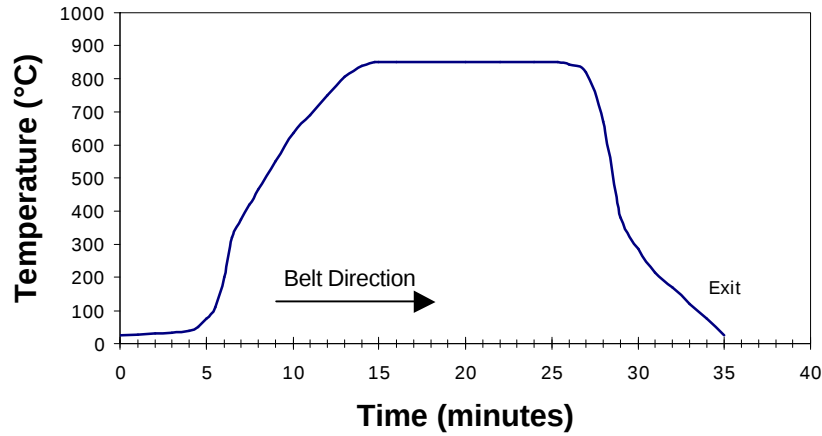
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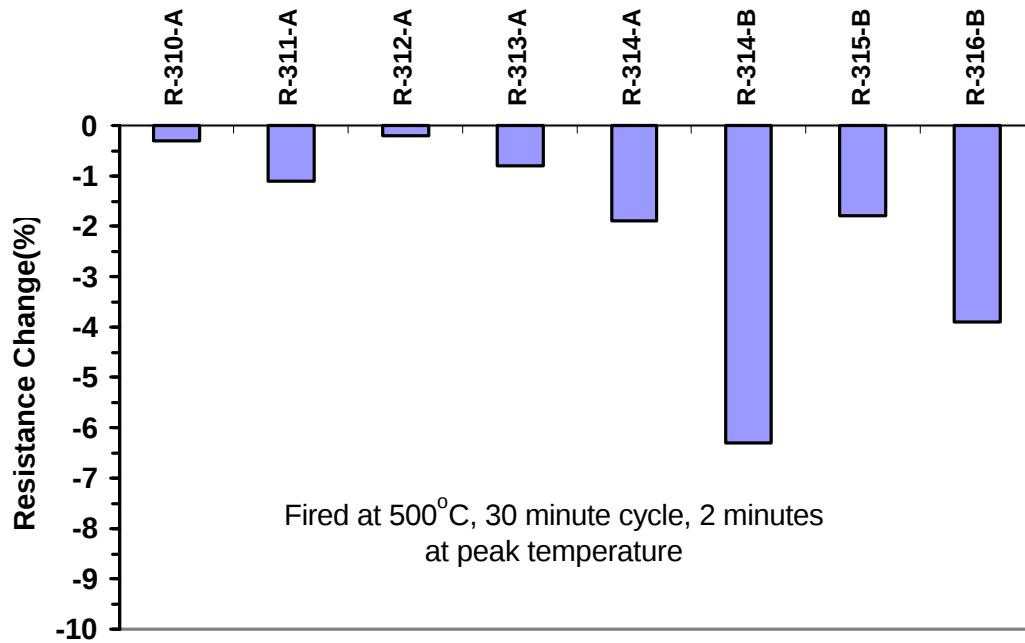
See Caution and Disclaimer on other side.

Typical 850°C Firing Profile R-300-A/B



EFFECT OF OVERGLAZING ON R-300-A/B RESISTORS

RESISTANCE CHANGE AFTER OVERGLAZING WITH G-471



R-300-A/B 9910-F

CAUTION: Proper industrial safety precautions should be exercised in using these products. Use with adequate ventilation. Avoid prolonged contact with skin or inhalation of any vapors emitted during use or heating of these compositions. The use of safety eye goggles, gloves or hand protection creams is recommended. Wash hands or skin thoroughly with soap and water after using these products. Do not eat or smoke in areas where these materials are used. Refer to appropriate MSDS sheet.

DISCLAIMER: The product information and recommendations contained herein are based on data obtained by tests we believe to be accurate, but the accuracy and completeness thereof is not guaranteed. No warranty is expressed or implied regarding the accuracy of these data, the results obtained from the use hereof, or that any such use will not infringe any patent. Electro-Science assumes no liability for any injury, loss, or damage, direct or consequential arising out of its use by others. This information is furnished upon the condition that the person receiving it shall make their own tests to determine the suitability thereof for their particular use, before using it. User assumes all risk and liability whatsoever in connection with their intended use. Electro-Science's only obligation shall be to replace such quantity of the product proved defective.

R-300-A/B RESISTOR SERIES

TYPICAL RESISTOR PROPERTIES

PROPERTIES	R-310-A	R-311-A	R-312-A	R-313-A	R-314-A	R-314-B	R-315-B	R-316-B
RESISTIVITY ^a (Ω/square)	1	10	100	1 k	10 k	10 k	100 k	1 M
SHIPPING SPECIFICATION (%)	± 30	± 10	± 10	± 10	± 10	± 10	± 10	± 10
COEFFICIENT OF VARIATION (%)	< 8	< 8	< 8	< 8	< 7	< 5	< 5	< 8
VISCOSITY ^b (Pa·s)	225 ± 25					300 ± 50		
DRIED THICKNESS (μm)	22.5 ± 2.5					20.0 ± 2.0		
THINNER	ESL 401							
TCR ^c (ppm/°C)	50 ± 100	0 ± 100	0 ± 100	0 ± 50	0 ± 50	0 ± 100	0 ± 100	0 ± 100
STOL ^d (V/mm)	1.65	7.38	24.6	76.8	137	150	350	330
STD. WORKING VOLTAGE ^e (V/mm)	0.66	2.95	9.84	30.7	54.8	60	140	130
MAX RATED POWER ^f (mW/mm ²)	436	871	968	944	300	360	190	17
QUAN-TECH NOISE (dB)	NA	NA	≤ -10	≤ -10	≤ -10	≤ 2	≤ 5	NA
LASER TRIM (%ΔR) (1000 hours at 150°C)	NA	≤ 0.3	≤ 0.3	≤ 0.3	≤ 0.3	≤ 0.3	≤ 0.4	≤ 0.5
TERMINATION OF CALIBRATION	ESL 9693-S							

The R-314-B is used as a blending member with R-315-B. For use as a 10 k Ω /sq. resistor, R-314-A is recommended.

^a CALIBRATION: Resistor size used for tests; A—1.25 mm square; B—1.0 mm square at dried thickness shown.

^b VISCOSITY: Brookfield RVT, ABZ Spindle, 10 rpm, 25.5°C $\pm$ 0.5°C.

^c CTCR: -55°C to +25°C. HTCR: +25°C to +125°C.

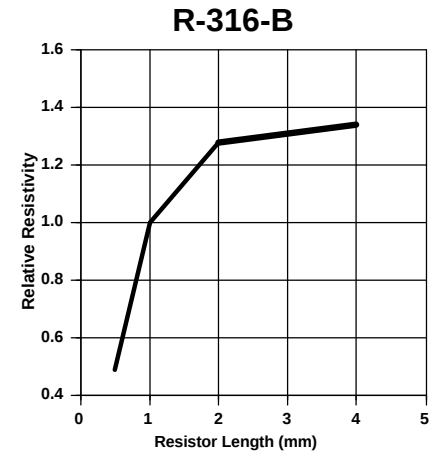
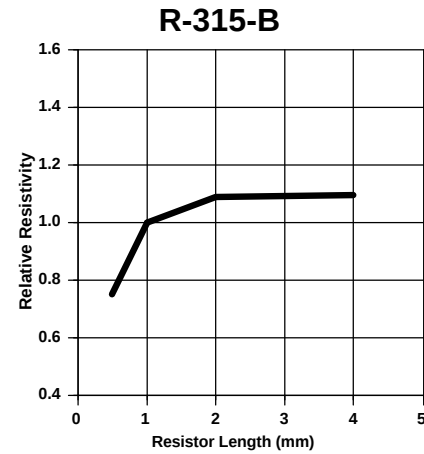
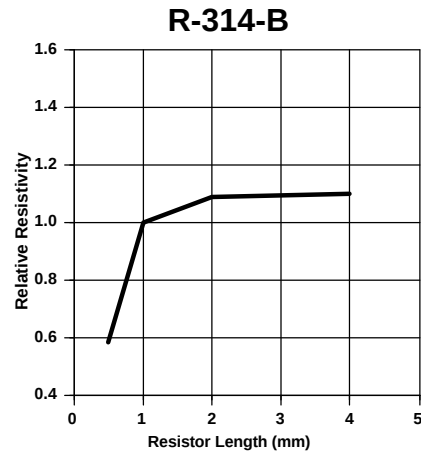
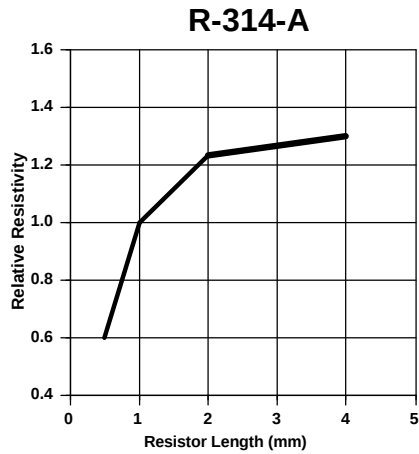
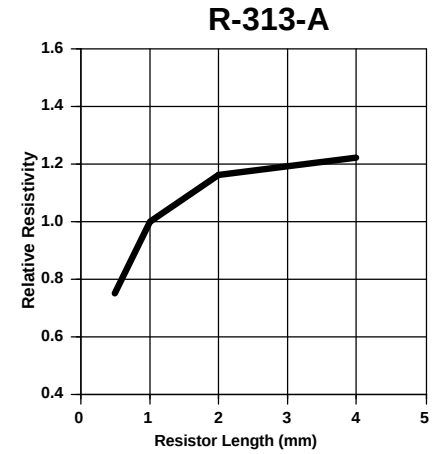
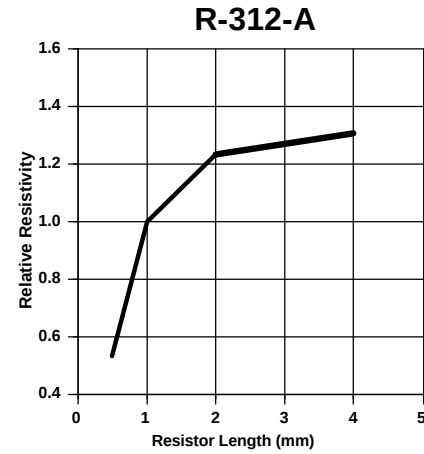
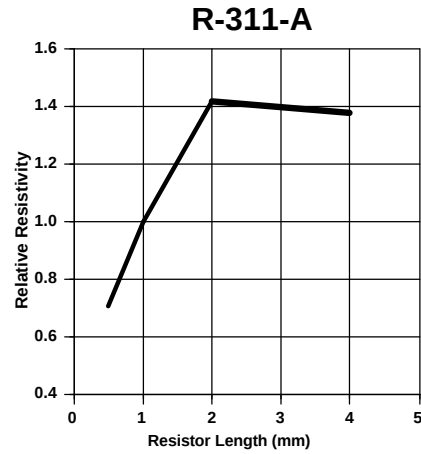
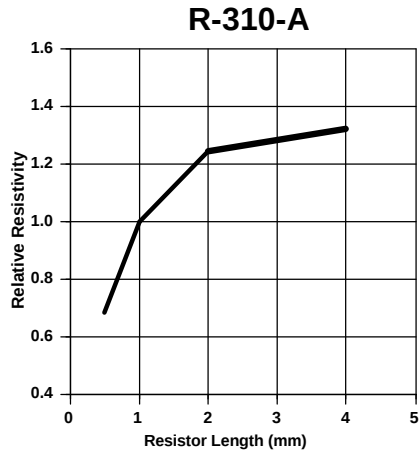
^d STOL: Voltage required, 5 second duration, to induce a resistance change of $\pm$ 0.1% at 25°C. Resistor size as in 1.

^e STANDARD WORKING VOLTAGE: 0.4 x STOL Voltage.

^f MAXIMUM RATED POWER: (Standard Working Voltage)²/Resistance.

R-300-A/B Resistor Series

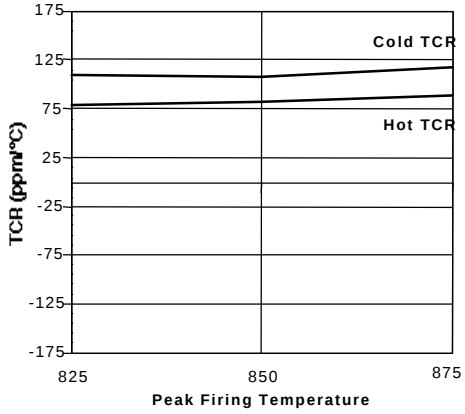
RESISTANCE VERSUS LENGTH



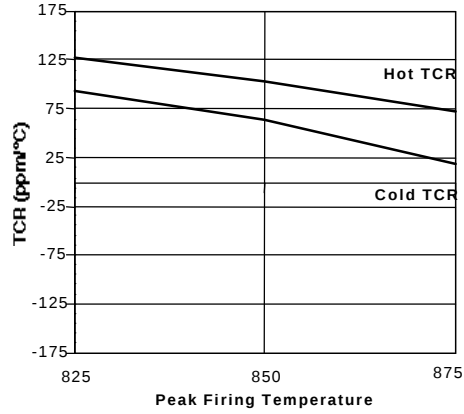
R-300-A/B Resistor Series

TCR VERSUS PEAK FIRING TEMPERATURE (10 minutes at peak temperature)

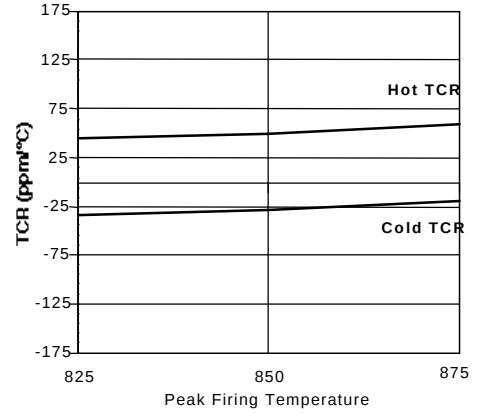
R-310-A



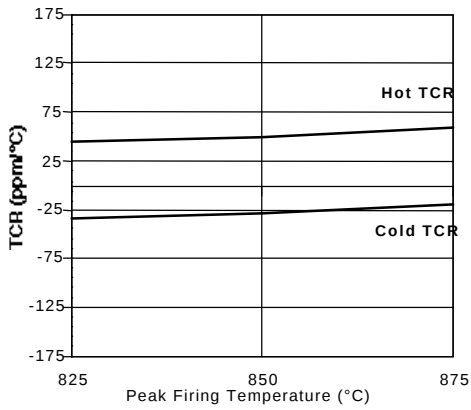
R-311-A



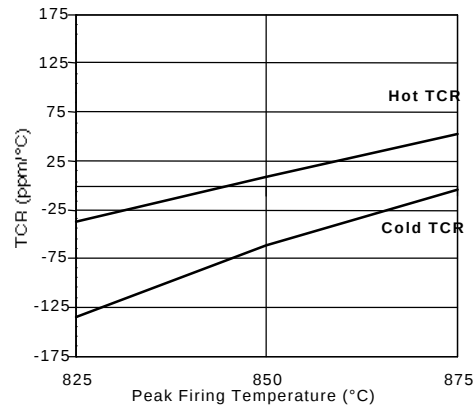
R-312-A



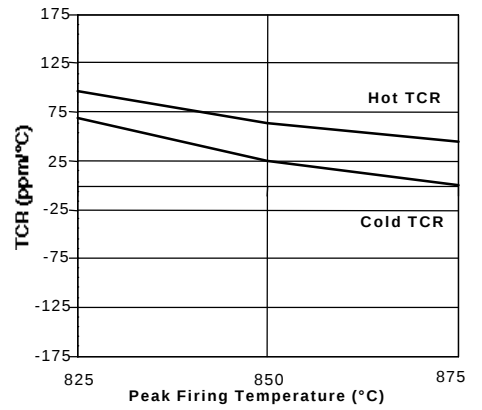
R-313-A



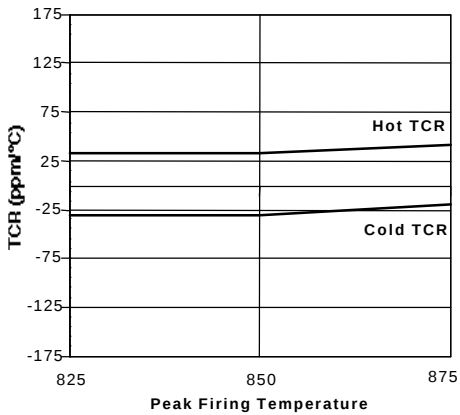
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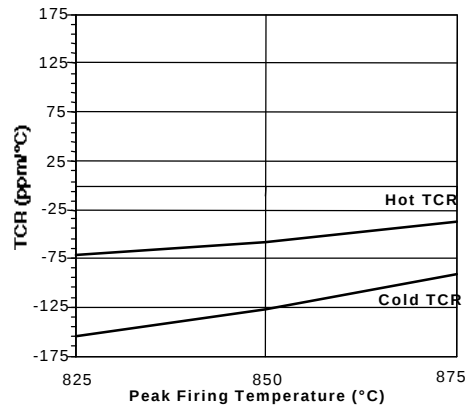
R-314-B



R-315-B



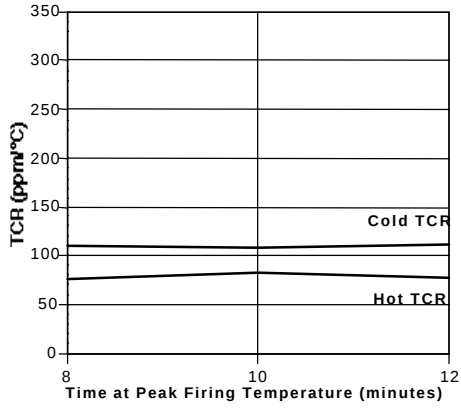
R-316-B



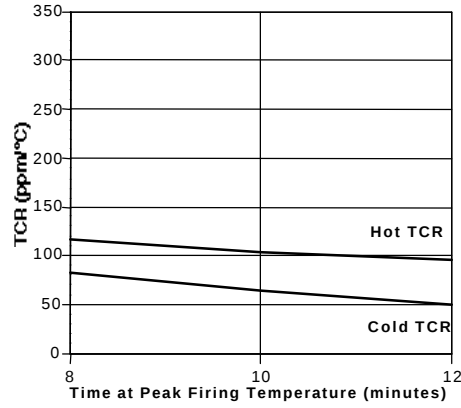
R-300-A/B Resistor Series

TCR VERSUS TIME AT PEAK FIRING TEMPERATURE (850°C)

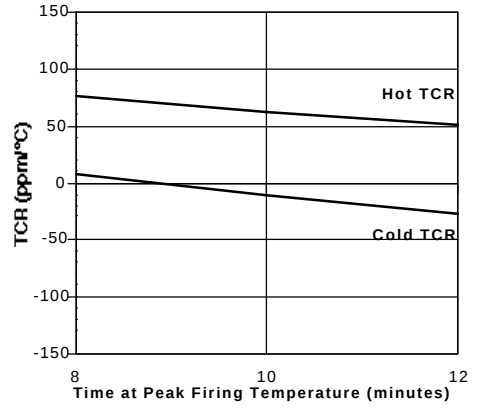
R-310-A



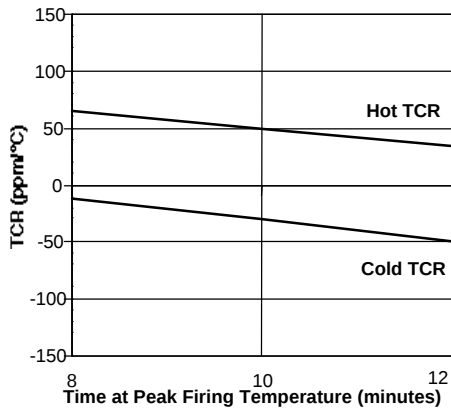
R-311-A



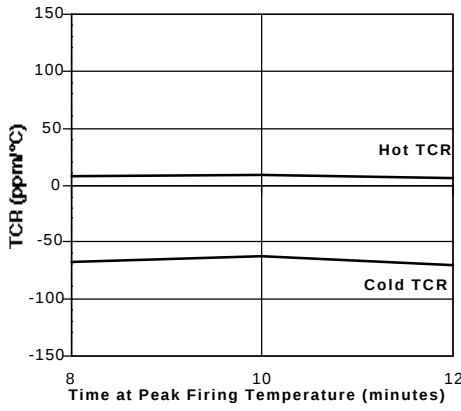
R-312-A



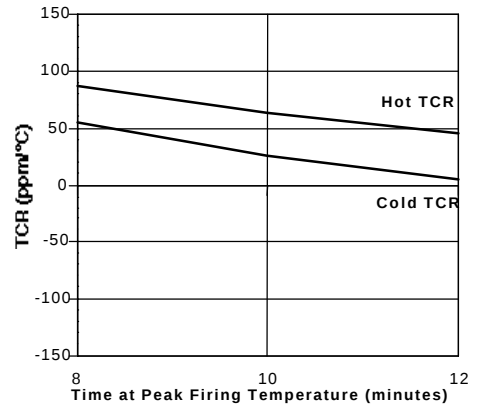
R-313-A



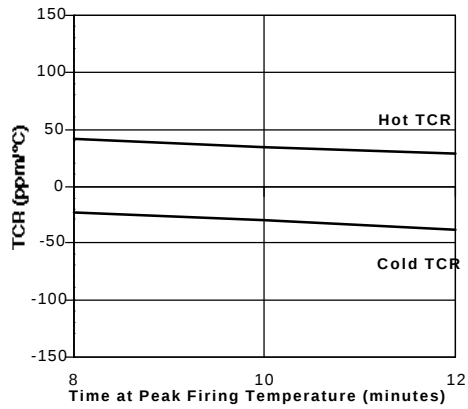
R-314-A



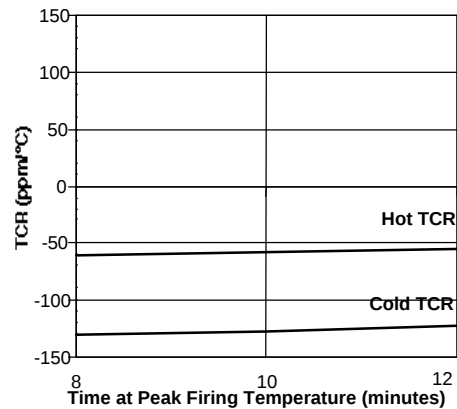
R-314-B



R-315-B

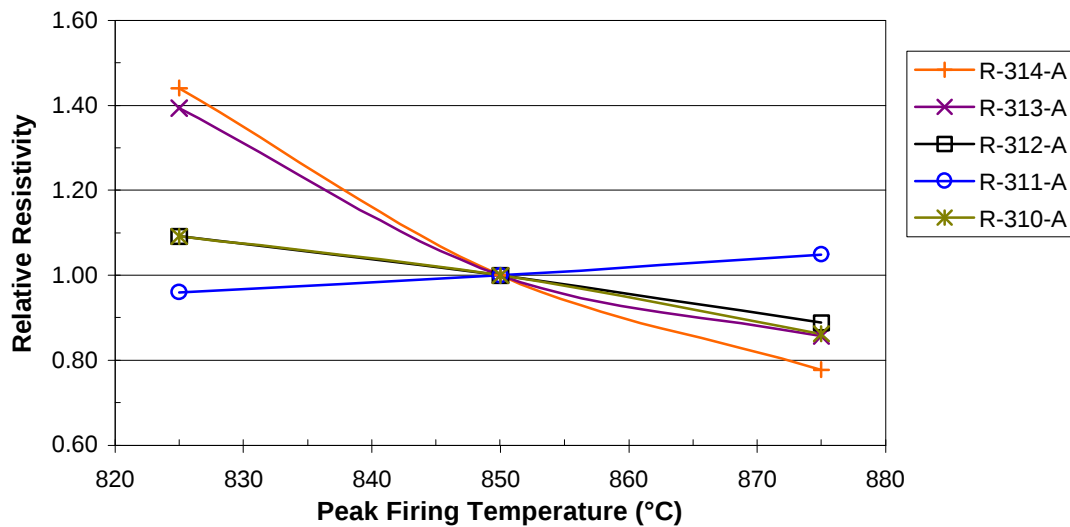


R-316-B

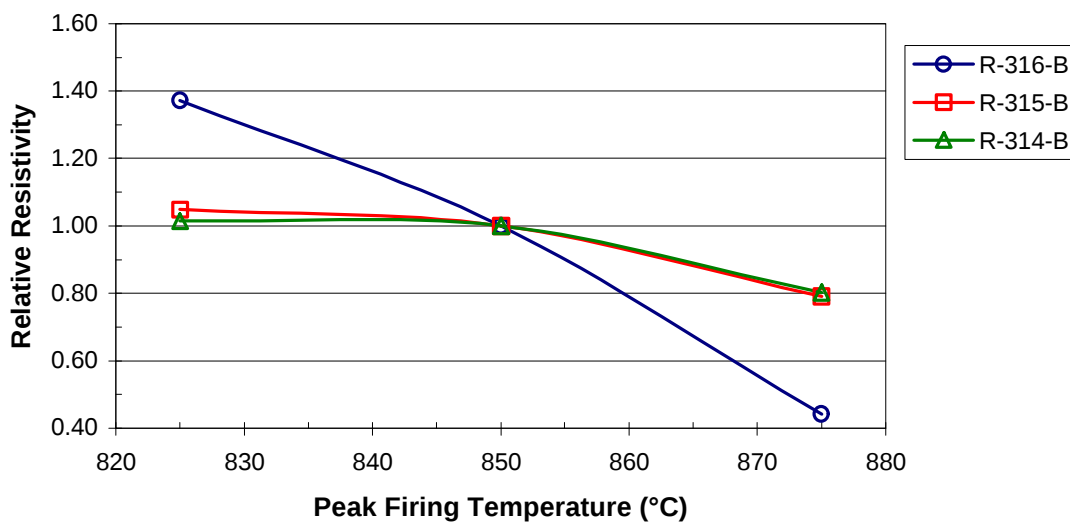


R-300-A/B Resistor Series

R-300-A SERIES - RELATIVE RESISTIVITY vs. PEAK FIRING TEMPERATURE



R-300-B SERIES - RELATIVE RESISTIVITY vs. PEAK FIRING TEMPERATURE

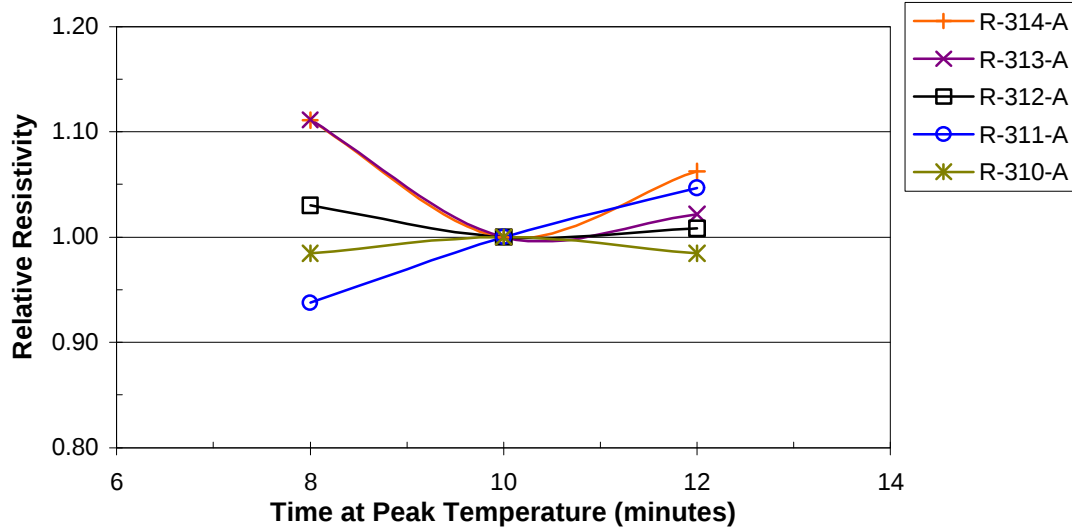


Time at peak temperature = 10 minutes.

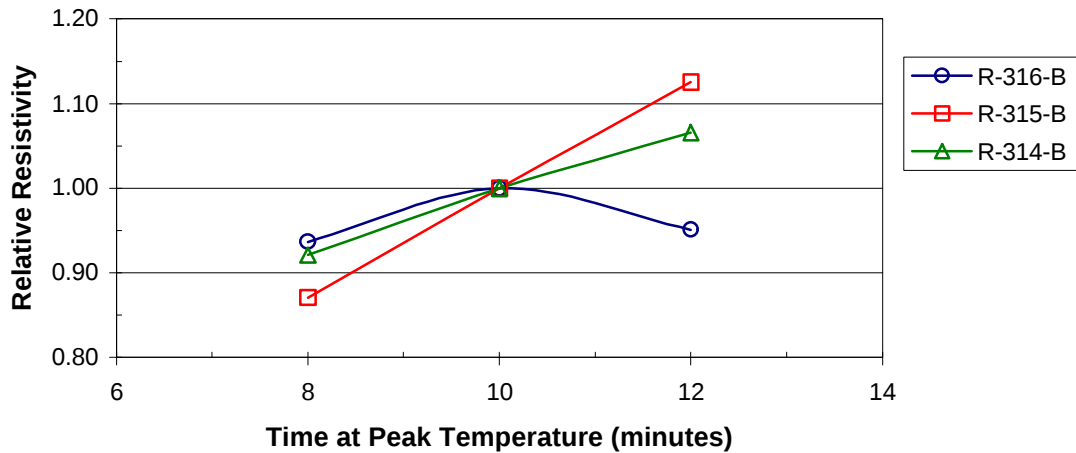
Relative Resistivity = resistivity at specified peak firing temperature/resistivity at 850°C.

R-300-A/B Resistor Series

R-300-A - RELATIVE RESISTIVITY vs. TIME AT PEAK TEMPERATURE



R-300-B - RELATIVE RESISTIVITY vs. TIME AT PEAK TEMPERATURE



Peak temperature = 850°C

Relative Resistivity = resistivity at specified time at peak temperature/resistivity at 10 minutes.