

SILVALOY® 604 VTG⁽¹⁾
(BRAZE™ 604 VTG⁽¹⁾, SILVALOY® B60TV)

NOMINAL COMPOSITION

	Silvaloy 604 <u>Grade 1</u>	Silvaloy 604 <u>Grade 2</u>
Silver	60.0% ± 1.0%	60.0% ± 1.0%
Copper	Remainder	Remainder
Tin	10.0% ± 0.5%	10.0% ± 0.5%
Zinc	0.001% Max	0.002% Max
Cadmium	0.001% Max	0.002% Max
Lead	0.002% Max	0.002% Max
Phosphorous	0.002% Max	0.020% Max
Carbon	0.005% Max	0.005% Max
Other high vapor pressure elements each ⁽²⁾	0.001% Max	0.002% Max
Total all high vapor pressure elements (Including zinc, cadmium, and lead)	0.010% Max	0.010% Max
Total all other impurity elements	0.01% Max	0.05% Max

⁽¹⁾ Vacuum Tube Grade

⁽²⁾ Elements with a vapor pressure higher than 10⁻⁷ Torr (1.3 x 10⁻⁵ Pa) at 932°F (500°C)

PHYSICAL PROPERTIES

Color	White
Melting Point (Solidus)	1115°F (602°C)
Flow Point (Liquidus)	1325°F (718°C)
Brazing Temperature Range	1325°F - 1550°F (718°C - 843°C)
Specific Gravity	9.58
Density (Troy oz/in ³)	5.17
Electrical Conductivity (%IACS) ⁽³⁾	7.10
Electrical Resistivity (Microhm-cm)	24.1

⁽³⁾IACS = International Annealed Copper Standard

PRODUCT USES

Silvaloy 604 (VTG) is a silver base braze filler metal used in making of low temperature seals in vacuum tube components. This product is often used in brazing of ferrous and non-ferrous alloys in a controlled atmosphere or vacuum furnace applications without the use of flux. Silvaloy 604 (VTG) is recommended for brazing of heat exchanges exposed to salt water in marine environment. Salt water exposure may cause dezincification in braze alloys containing zinc, particularly in joints involving copper-nickel tubing.

BRAZING CHARACTERISTICS

Silvaloy 604 (VTG) is a low temperature, low vapor pressure braze filler metal formulated to meet the need for a composition free from volatile constituents, particularly essential in the brazing of vacuum tubes. Silvaloy 603 can be used where low volatiles is not a requirement. Silvaloy 604 (VTG) filler metal can be used successfully to braze in hydrogen atmospheres without the use of flux. The tin content of this filler metal improves its wetting characteristics on ferrous base alloys over in comparison to binary silver copper braze filler metals. The addition

lowers the melting range versus binary silver copper compositions. There is some tendency for the filler metal to liquate, but this is minimized by rapid heating to brazing temperature.

PROPERTIES OF BRAZED JOINTS

The properties of a brazed joint are dependent upon the base metal, joint design and brazing technique. For controlled atmosphere brazing or vacuum brazing the recommended radial joint clearance for silver base alloys fall within 0.0015 in. - 0.002 in. (0.038 mm - 0.051 mm.) range.

CORROSION RESISTANCE

Silvaloy 604 (VTG) showed satisfactory performance when exposed to marine environment where exposure to salt water is imminent, or where dezincification of zinc containing filler metals is likely to occur.

AVAILABLE FORMS

Wire, strip, engineered preforms, specialty preforms per customer specification.

SPECIFICATIONS

Silvaloy 604 (VTG) alloy conforms to the following specifications:

- American Welding Society (AWS) A5.8M/A5.8 BVAg-18 Grade 1 and Grade 2
- ASME Boiler & Pressure Vessel Code, Sec II-C, SFA-5.8 BAg-18
- Society of Automotive Engineers (SAE) / AMS 4773
- Federal Specification QQ-B-654 BAg-18

APPLICABLE PRODUCT CODE(S)

The applicable Lucas-Milhaupt product code(s) for Silvaloy 604 (VTG):

Grade 1: A00000307, Legacy Codes: 27-604, 35592.

Grade 2: A00000049, Legacy Codes: 32-604, 24752.

SAFETY INFORMATION

The operation and maintenance of brazing equipment or facility should conform to the provisions of American National Standard (ANSI) Z49.1, "Safety in Welding and Cutting". For more complete information refer to the Safety Data Sheet for Silvaloy 604 (VTG).

WARRANTY CLAUSE

Lucas-Milhaupt, Inc. believes the information contained herein to be reliable. However, the information is given by Lucas-Milhaupt, Inc. without charge and the user shall use such information at its own discretion and risk. This information is provided on an "AS IS" AND "AS AVAILABLE" basis and Lucas-Milhaupt, Inc. specifically disclaims warranties of any kind, either express or implied, including, but not limited to, warranties of title or implied warranties of merchantability or fitness for a particular purpose. No oral advice or written or electronically delivered information given by Lucas-Milhaupt, Inc. or any of its officers, directors, employees, or agents shall create any warranty. Lucas-Milhaupt, Inc. assumes no responsibility for results obtained or damages incurred from the use of such information in whole or in part.