

## **SILVALOY<sup>®</sup> 299** (BRAZE<sup>™</sup> 299, SILVALOY<sup>®</sup> A30N)

### ***NOMINAL COMPOSITION***

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Silver	30.0% ± 1.0%
Copper	36.0% ± 1.0%
Zinc	32.0% ± 1.0%
Nickel	2.0% ± 0.25%
Other Elements (Total)	0.15% Max

### ***PHYSICAL PROPERTIES***

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Color	Light Yellow
Melting Point (Solidus) <sup>(1)</sup>	1250°F (676°C)
Flow Point (Liquidus) <sup>(1)</sup>	1450°F (788°C)
Brazing Temperature Range	1450°F - 1550°F (788°C - 843°C)
Specific Gravity	8.62
Density (Troy oz/in <sup>3</sup> )	4.54
Electrical Conductivity (% IACS) <sup>(2)</sup>	NA
Electrical Resistivity (Microhm-cm)	NA

<sup>(1)</sup> Solidus & Liquidus values were approximated using Differential Thermal Analysis (DTA)

<sup>(2)</sup> IACS = International Annealed Copper Standard

### ***PRODUCT USES***

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Silvaloy 299 is an intermediate temperature brazing alloy for use on stainless steels, mild steels, cast and malleable irons and various non-ferrous alloys. This alloy can be used in brazing tungsten carbide tools and inserts used in metal cutting, mining and wood working applications.

### ***BRAZING CHARACTERISTICS***

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Silvaloy 299 is an intermediate temperature silver brazing filler metal with a fairly long (200°F/112°C) melting range. It has a tendency to liquate (i.e. separate into low and high melting constituents) and therefore it is preferable to use this filler metal where the assembly can be heated rapidly through the filler metal melting range, or where the assembly can be preheated before the filler metal is applied. Handy<sup>®</sup> Flux is normally used with Silvaloy 299 but where extra fluxing action is indicated, such as on some types of stainless steel or carbides, it may be found beneficial to use Handy<sup>®</sup> Flux Type B-1.

### ***PROPERTIES OF BRAZED JOINTS***

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The properties of a brazed joint are dependent upon numerous factors including base metal properties, joint design, metallurgical interaction between the base metal and the filler metal. Tensile strength of joints in butt joint configuration at room temperature for low carbon steel has ranged from 39,000 to 71,500 lbs/in<sup>2</sup> [PSI].

## ***CORROSION RESISTANCE***

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Preliminary corrosion tests of Silvaloy 299 showed similar order of resistance to interface corrosion as Silvaloy 505 when 304 & 321 stainless steel joints were exposed to tap water for 14 days. Brazed assemblies of 321 stainless steel with Silvaloy 299 showed appreciable interface corrosion when exposed to salt water solution, whereas Silvaloy 505 showed only incipient corrosion at the feather edges of the fillet. For the same period in parallel tests with 400 series stainless exposed to salt water solution Silvaloy 299 and Silvaloy 505 showed appreciable interface corrosion.

When stainless steels are brazed with flux, it appears that chromium is selectively removed from the surface by oxidation and subsequent solution of the chromic oxide in the molten flux. This leaves a thin layer of chromium-free iron, which is attacked by aerated water particularly when chlorides are present. The small amount of nickel contained in the braze filler metal increases the resistance to corrosion of the vulnerable area, and for most applications where 300 series steels are used this suffice. For the 400 series stainless exposed to water or moisture, the interface corrosion may be delayed but not stopped. For more information on interface corrosion, please refer to Lucas-Milhaupt's T-9 Technical Bulletin.

In applications where corrosion resistance is critical or the final operation conditions are unknown, it is recommended to conduct a throughout corrosion tests prior to running production parts.

## ***AVAILABLE FORMS***

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

## ***SPECIFICATIONS***

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Silvaloy 299 alloy conforms to the following specifications: N/A

## ***APPLICABLE PRODUCT CODE(S)***

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The applicable Lucas-Milhaupt product code(s) for this technical data sheet: 32-299, 35597.

## ***SAFETY INFORMATION***

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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 Material Safety Data Sheet for Silvaloy 299.

## ***WARRANTY CLAUSE***

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