LucasMilhaupt®
A Handy & Harman Company
Global Brazing Solutions®

Technical Data Sheet

HANDY ONE® SILVALOY 299

(HANDY ONE® BRAZE™ 299)

This proprietary family of brazing & soldering products eliminates the need for a separate fluxing operation, which can result in a significant increase in productivity while minimizing flux exposure to your personnel and plant equipment.

GENERAL DESCRIPTION

Handy One is a trademark for a family of flux-cored brazing materials that offers numerous advantages compared to traditional metal joining methods. It consists of a filler metal in strip form that is rolled around a powdered flux. Formulations currently exist for silver (and aluminum based) brazing filler metals and it is available on spools, coils or rods for wire feed applications and as preformed rings and shapes for automated production lines.

Some of the primary advantages of Handy One cored wire include:

- It simplifies the brazing process by eliminating the manual fluxing operation; this also reduces flux exposure to your brazing personnel.
- Joint quality and throughput can be improved due to the consistent application of flux and filler metal.
- Reduces heating time and secondary post braze operations, increasing productivity and throughput
- Improved strength due to a reduction in flux inclusions at the joint interface
- Reduces the flux in your wastewater effluent by as much as 75%
- Multiple formulations exist for a variety of base metals, joint designs and heating methods.

These materials will join ferrous and non-ferrous metals including steel, stainless steel, copper, brass, and bronze.

NOMINAL COMPOSITION

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

Color	Light Yellow
Melting Point (Solidus) [(1)]	1250°F (676°C)
Flow Point (Liquidus) [(1)]	1450°F (788°C)
Brazing Temperature Range	1450°F - 1550°F (788°C - 843°C)
Specific Gravity	8.83
Density (Troy oz/in^3)	4.65
Electrical Conductivity (%IACS) [(2)]	N/A
Electrical Resistivity (Microhm-cm)	N/A

[(1)] Solidus & Liquidus values were approximated using Differential Thermal Analysis (DTA)
[(2)] IACS = International Annealed Copper Standard

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PRODUCT USES

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

Silvaloy 299 is an intermediate temperature silver brazing filler metal with a fairly long (200°F/93°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.

PROPERTIES OF BRAZED JOINTS

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^2 [PSI] (268 to 493 [MPa]).

Lucas-Milhaupt, Inc. has several different fluxes available depending upon the material form (wire or preformed shape) as well as base metals and heating methods utilized.

- **Restrictive Flux** – protects the parts being joined, yet restricts the flow of the filler metal, enabling the building of fillets and minimizing post braze secondary operations. This flux is recommended for most hand feed or wire feed applications. Flux content is typically 12% (±3%) of the total volume.

- **Free Flowing Flux** – This very fluid flux provides excellent protection of your parts and facilitates filler metal flow. Recommended for preformed ring applications, it is typically 18% (±3%) of the total volume.

- **Heat Resistant Flux** – Boron modified flux for large mass assemblies or long heating cycles. It is also typically 18% (± 3%) of the total volume and also recommended for preformed ring applications.

Please Note: Flux percentages may vary depending upon material size and finished form, please contact Lucas Milhaupt's Technical Services Department for specific product and process parameters.

CORROSION RESISTANCE

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.

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CORROSION RESISTANCE (CONT.)

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.
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AVAILABLE FORMS

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

SPECIFICATIONS

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

APPLICABLE PRODUCT CODE(S)

The applicable Lucas-Milhaupt product code(s) for this technical data sheet: 30-299

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 Material Safety Data Sheet for Handy One Silvaloy 299.

WARRANTY CLAUSE

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