Handy & Harman of Canada, Limited
Handy & Harman du Canada, Limitée
290 CARLINGVIEW DR., REXDALE, ONTARIO M9W 5G1
Phone: (416) 675-1860 · (800) 463-1465 Fax: (416) 675-1956 · (800) 426-3907

TECHNICAL DATA SHEET

SIL-FOS

Nominal Composition:

Silver:	15.0% ± 0.5%
Copper:	80.0% ± 1.0%
Phosphorus:	5.0% ± 0.20%
All Others:	0.15% maximum

Physical Properties:

Colour:	Gray
Solidus (Melting Point):	643°C (1190°F)
Liquidus (Flow Point)	802°C (1475°F)
Specific Gravity	8.44
Density (lbs/cu.in.)	0.305
Electrical Conductivity (%IACS)	9.9
Electrical Resistivity (Microohm-cm)	17.4
Brazing Temperature Range	704°-816°C (1300°-1500°F)

Uses:

Sil-Fos was developed primarily for use on copper, but has extended to use on other nonferrous copper base alloys. It is used extensively on refrigeration units, air conditioning apparatus, electrical conductors, copper and brass pipe fittings, and other copper and brass equipment.

Brazing Characteristics:

Sil-Fos is a copper rich alloy that is self-fluxing on copper by virtue of the phosphorus content. Sil-Fos, due to its lower phosphorus content, is preferable to Sil-Fos 5 where close clearances cannot be maintained or where fillets are specified.

Sil-Fos has a strong tendency to liquate (i.e. to separate into low and high melting constituents) if heated slowly through their melting range, as normally occurs in furnace brazing. This results in leaving a “skull” of unmelted alloy behind which may be objectionable from the standpoint of appearance. In furnace brazing it is preferable to preplace the alloy inside the joint where the “skull” is not visible.

The self-fluxing of this alloy is effective on copper only. With copper based alloys, such as brass or bronze, the joints should be fluxed with Handy Flux. Sil-Fos should not be used on nickel-base or ferrous alloys, as the phosphorus reacts with the nickel or iron to form brittle compounds at the interface of the joints.

Properties of Brazed Joints:

The properties of a brazed joint are dependent upon the base metal, joint design, brazing technique, etc. The following information, however, should serve as a guide for estimating the results that can be achieved with Sil-Fos on copper and copper base alloys.

Brazed butt joints tested at room temperature gave the following average values:

	Tensile Strength psi	Elongation % in 2”
Copper	30,000 – 35,000	15.0 – 25.0
Brass	35,000 – 40,000	20.0 – 25.0
Nickel-Silver	35,000 – 40,000	2.0 – 5.0

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SIL-FOS

Properties of Brazed Joints: *(continued)*

Brazed butt joints tested at elevated temperatures gave the following average values. (short time tests):

	Test Temperature °C	Test Temperature °F	Tensile Strength psi	Elongation % in 2"
Copper	95	200	32,050	32.8
	150	300	29,500	31.2
	205	400	28,100	28.1
	260	500	23,600	24.5
	315	600	22,700	24.5
	370	700	17,700	12.5
	425	800	15,800	9.4
Brass	95	200	34,000	19.2
	150	300	34,700	28.1
	205	400	30,700	28.1
	260	500	28,500	19.2
	315	600	22,500	13.0
	370	700	16,700	6.8
	425	800	11,600	2.9

Corrosion Resistance:

Normally the corrosion resistance of Sil-Fos is of the same order as copper, but under certain conditions it may corrode more rapidly. Sil-Fos should not be used where the joints are exposed to sulphur compounds, especially in gases or oils at temperatures above normal room temperature. As the corrosion by sulphur is cumulative, even very small percentages will eventually cause failure of the joint by disintegration. Exposure to pressured steam can also result in accelerated corrosion.

The following table lists the results of corrosion tests on brazed copper joints in several media:

Solution	Test Temperature °C	Test Temperature °F	Conditions	Loss in Weight Mgs/dcm^2/day
10% Acetic Acid	Room		Constant Immersion	33.3
10% Acetic Acid	100	212	Constant Immersion	243.0
5% Hydrochloric Acid	Room		Constant Immersion	50.6
5% Hydrochloric Acid	100	212	Constant Immersion	395.0
5% Lactic Acid	Room		Alternate Immersion (22 x's/min.)	48.4
5% Lactic Acid	55	130	Alternate Immersion (22 x's/min.)	381.0
Sodium Chloride (N/10)	Room		Constant Immersion	9.1
Sodium Chloride (N/10)	100	212	Constant Immersion	143.0
5% Sulphuric Acid	Room		Constant Immersion	36.3
5% Sulphuric Acid	100	212	Constant Immersion	178.0

Equivalent Specifications:

This alloy conforms to the following specifications.

AWS A5.8-04	BCuP-5
ASME Boiler & Pressure Vessel Code, SecII-C	BCuP-5

Available Forms:

Strip, wire, powder and preforms to specification.

Comments:

Handy & Harman of Canada, Limited believes the information contained herein to be reliable. However, the technical information is given by Handy & Harman of Canada, Limited without charge and the user shall employ such information at its own discretion and risk, and Handy & Harman of Canada, Limited assumes no responsibility for results obtained or damages incurred from the use of such information in whole or in part.

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