

Brazing

The melting temperature of the filler metal is greater than 800 °F but less than the melting temperature of the base metal. For example: Silver brazing, depending on the alloy, has a range of 1045 °F to 1700 °F. The alloy bonds the two metals together when flux, alloy and adequate heat are applied to a clean joint with the proper fit-up. Some alloys require 0.001-0.003 gap in the base metals, while some work best with a gap of 0.005. The alloy is drawn into the joint by capillary action. This requires more attention to be paid to fit-up, flux, and heat in order for this process to be successful.

Note: The exception to the flux requirement is Copper-Phosphorus Brazing Alloys. In copper to copper applications, no flux is required but you should back purge the part with nitrogen for an oxide-free surface.

Brazing and Soldering Alloys and Fluxes

Brazing Selection Chart

Base Metal 1	Base Metal 2	Brazing Alloy	Flux	Temperature	Torch
Copper	Copper	15	None	1190-1475 °F (640-800 °C)	Air/FG-2
Copper	Brass	15	None	1190-1475 °F (640-800 °C)	Air/FG-2
Copper	Steel	A56T	Black	1145-1205 °F (620-650 °C)	Oxy/FG-2
Copper	Stainless	50N	Black	1290-1375 °F (700-750 °C)	Oxy/FG-2
Copper	Cast Iron	50N	White	1290-1375 °F (700-750 °C)	Oxy/FG-2
Copper	Tool Steel	50N	White	1290-1375 °F (700-750 °C)	Oxy/FG-2
Brass	Brass	15	White	1190-1475 °F (640-800 °C)	Air/FG-2
Brass	Steel	A56T	White	1145-1205 °F (620-650 °C)	Oxy/FG-2
Brass	Stainless	50N	Black	1290-1375 °F (700-750 °C)	Oxy/FG-2
Brass	Cast Iron	50N	Black	1290-1375 °F (700-750 °C)	Oxy/FG-2
Steel	Steel	17 Nickel Silver	HW 17	1690-1715 °F (920-940 °C)	Oxy/FG-2
Steel	Stainless	50N	Black	1290-1375 °F (700-750 °C)	Oxy/FG-2
Steel	Cast Iron	17 Nickel Silver	HW 17	1690-1715 °F (920-940 °C)	Oxy/FG-2
Stainless	Stainless	50N	Black	1290-1375 °F (700-750 °C)	Oxy/FG-2
Stainless	Cast Iron	50N	Black	1290-1375 °F (700-750 °C)	Oxy/FG-2
Cast Iron	Cast Iron	17 Nickel Silver	HW 17	1690-1715 °F (920-940 °C)	Oxy/FG-2

Soldering

The melting temperature of the filler metal is less than 800 °F. Caution: Silver soldering is a term that is commonly misused to discuss silver brazing. Silver solders usually consist of Tin and Silver with a silver content of less than 6%.

Soldering Selection Chart

Base Metal 1	Base Metal 2	Soldering Alloy	Flux	Temperature	Torch
Stainless	Stainless	Tin Silver	Acid	430 °F (220 °C)	Air/FG-2
		Tin Antimony	Acid	475 °F (245 °C)	Air/FG-2
Stainless	Copper	Tin Silver	Acid	430 °F (220 °C)	Air/FG-2
		Tin Antimony	Acid	475 °F (245 °C)	Air/FG-2
Copper	Brass	Tin Silver	Acid	430 °F (220 °C)	Air/FG-2
		Tin Antimony	Acid	475 °F (245 °C)	Air/FG-2

Flame adjustment

For soldering and brazing, use a carburizing flame. Solders have tensile strengths of 3,000 to 10,000 psi. Brazing alloys have tensile strengths of 50,000 to 90,000 psi.

Caution

Never solder an oxygen line. OSHA and NFPA require brazing. If the line is copper, use PROSTAR® 15 with a nitrogen backup at 30 cfm and zero back pressure.

Brazing Alloys and Fluxes

PROSTAR® Premium Quality Brazing Alloys and Fluxes are specifically designed and engineered to meet the most demanding operations.

Its extensive product line includes Copper-Phosphorus and Cadmium-Free Silver Brazing Alloys and Brazing Fluxes.

Cadmium-Free Silver Brazing Alloys

Part Number	Brazing Alloy	Packaging	Solidus	Liquidus
WJT59685	A35 Silver	3/64" x 1 T oz. Canister	1150 °F (620 °C)	1350 °F (730 °C)
WJT59687	A45 Silver	1/16" x 50 T oz. Coil	1225 °F (660 °C)	1370 °F (740 °C)
WJT59693	A50N Silver	1/16" x 50 T oz. Coil	1220 °F (660 °C)	1305 °F (710 °C)
PRS59697	PROSTAR® A56T Silver	1/16" x 1 T oz. Canister	1145 °F (620 °C)	1205 °F (650 °C)
WJT55043	A56T Silver	1/16" x 50 T oz. Coil	1145 °F (620 °C)	1205 °F (650 °C)
WJT59699	A56T Silver	1/32" x 50 T oz. Coil	1145 °F (620 °C)	1205 °F (650 °C)

Copper-Phosphorus Brazing Alloys

Part Number	Brazing Alloy	Packaging	Solidus	Liquidus
WJT30979	0	.050 X 1/8" X 20" 1 lb Tube	1310 °F (710 °C)	1460 °F (790 °C)
WJT31221	5	.050 X 1/8" X 20" 1 lb Tube	1190 °F (640 °C)	1490 °F (810 °C)
PRS31223	PROSTAR® 15	.050 X 1/8" X 20" 1 lb Tube	1190 °F (640 °C)	1475 °F (800 °C)

Silver Brazing Flux and Black Flux

Part Number	Flux	Packaging
PRS75061	PROSTAR® Silver Brazing Flux (White)	7 oz. Jar
WJT75062	Silver Brazing Flux (White)	1/2 lb Jar
PRS75063	PROSTAR® Silver Brazing Flux (White)	1 lb Jar
WJT75060	Black Flux	1 lb Jar



PROSTAR® Cadmium-Free Silver Brazing Alloys



PROSTAR® Copper-Phosphorus Brazing Alloys



PROSTAR® Silver Brazing Flux and Black Flux

Praxair Tip

A45 is Cadmium free. However, it is a very sluggish alloy and may not produce your desired results.

PROSTAR® Cadmium-Free A56T presents equal to or better results than cadmium bearing alloys. It is also approved by the National Sanitary Foundation (NSF) for parts used in food service.

50N is Cadmium-free.

This alloy contains nickel to make it resistant to inter-granular corrosion caused by acids leaching out the zinc content of the brazing alloy.



PROSTAR® Bronze Brazing Alloys (15 and 15FC)

PROSTAR® 15

R-CuZn-C	1 lb (.45 kg)	3 lb (1.2 kg)	5 lb (2.3 kg)
1/16	PRS61300	PRS61303	PRS61305
3/32	PRS61310	PRS61313	PRS61315
1/8	PRS61320	PRS61323	PRS61325

PROSTAR® 15FC (Flux Coated)

R-CuZn-C	1 lb (.45 kg)	3 lb (1.2 kg)	5 lb (2.3 kg)
1/16	PRS61400	PRS61403	
3/32	PRS61410	PRS61413	
1/8	PRS61420	PRS61423	

- No flux is needed for gas welding with R-45 or R-60
- R45 is a general purpose oxy/acetylene rod for welding mild steels
- R60 provides additional strength and ductility for a variety of steels

PROSTAR® Steel Gas Welding Rods

PROSTAR® 45

R-45	1 lb (.45 kg)	3 lb (1.2 kg)	5 lb (2.3 kg)
1/16	PRS61302	PRS61308	PRS61309
3/32	PRS61312	PRS61318	PRS61319
1/8	PRS61322	PRS61328	PRS61329

PROSTAR® 60

R-60	1 lb (.45 kg)	3 lb (1.2 kg)	5 lb (2.3 kg)
1/16	PRS61503	PRS61506	PRS61507
3/32	PRS61513	PRS61516	PRS61517
1/8	PRS61523	PRS61526	PRS61527

- Recommended shielding gas: argon or helium/argon mixtures
- E70S-2 is a triple deoxidized filler metal which can produce x-ray quality when it is used on killed steels
- E70S-6 is a silicon manganese deoxidized filler metal that produces very clean TIG deposits

PROSTAR® Steel TIG Welding Rods

E70S-2	1 lb (.45 kg)	3 lb (1.2 kg)	5 lb (2.3 kg)
1/16"	PRS61304	PRS61306	PRS61307
3/32"	PRS61314	PRS61316	PRS61317
1/8"	PRS61324	PRS61326	PRS61327

E70S-6	1 lb (.45 kg)	3 lb (1.2 kg)	5 lb (2.3 kg)
1/16"	PRS61404	PRS61406	PRS61407
3/32"	PRS61414	PRS61416	
1/8"	PRS61424	PRS61426	

PROSTAR® Silicon Bronze TIG Welding Rods

Silicon Bronze	1 lb (.45 kg)	3 lb (1.2 kg)	5 lb (2.3 kg)
1/16"	PRS61801	PRS61803	PRS61805
3/32"	PRS61811	PRS61813	PRS61815
1/8"	PRS61821	PRS61823	PRS61825

- Recommended shielding gas: argon or helium/argon mixtures
- ERCuSi-A is a silicon deoxidized copper-based filler metal which is used to attach two pieces of metal together where strength is secondary and cosmetics are primary.