

	ANNEALING TEMPERATURE	ANNEALING TEMPERATURE	Color of Metal @ Annealing Temp.	QUENCHING	NOTES	MELT POINT
	RANGE Farenheit	RANGE Celsius				
Temperature Color Guide. >>	You can buy a Temperature Pen that will indicate when the metal has reached the correct temperature. McMaster Carr sells them - see the link below.	Black heat is a description used for when the work piece no longer glows red (840° F/449°C – 930° F/499°C). >>	Visible Red - 900° F, Cherry Red - 1400° F, Dull Red - 1200°F, Bright Salmon Red - 1600° F	Argentium® Silver retains heat longer than traditional	Additional annealing signs. Metal composition, misc. info	
Aluminum			Coat with bar soap - heat, with torch, until soap starts to turn black - or burns	Air cool		Melting point: 1220°F/660°C &&
Argentium Silver®* comes in two alloys: 935 and 960 #	1050°F to 1150°F.	565.56°C to 621.11	Pale Visible Red	Argentium® Silver retains heat longer than traditional sterling. Please Note: It is important to wait for any visible red to disapate.	1) the ink from a Sharpie® permanent marker fades, and 2) the silver (if it has been brass-brushed or otherwise abraded) turns whitish.* From email Agentium Helpline: "The germanium content in Argentium changes the visual colour of the alloy when it is red hot... ie. Argentium silver glows a paler red colour than traditional sterling silver when it is at annealing and soldering temperatures."	Solidus: 1410°F (766°C). Liquidus: 1610°F (877°C)
Argentium Brand® 935				Quench at black heat. Furnace annealing should be carried out at 1050°F/565°C for approximately 30 minutes. \$\$	93.5% Fine Silver - approx. 1% Germanium - approx. 5.5% Copper	

Argentium Brand ® 960				Quench at black heat	96.0% Fine Silver - about 1% Germanium - approx: 3% copper	
Brass - Many varieties depending on metal alloyed with.	932°F to 1022°F ***	500°C to 550°C ***	Dark red (plum) - Metal begins to blacken. Visible to Bright Red.	High Brass and Low Brass can be quenched after annealing. %%	Brass will develop a "skin" of copper at certain temperatures. Remove with a mixture of pickle and hydrogen peroxide	
Brass - Gilding metal C21000	800°F to 1450°F +	425°C to 800°C +			95% Copper - 5% Zinc	
Brass - Low Brass - C24000	800°F to 1300°F +	425°C to 700°C +			80% Copper - 20% Zinc	
Brass - Red - C23000	800°F to 1350°F +	425°C to 725°C +			85% Copper - 15% Zinc	Melt Temp: 1877°F (1026°C) &
Brass - Yellow - C26800	800°F to 1300°F +	425°C to 700°C +			66% Copper - 34% Zinc	Melt Temp: 1706°F (931°C) &
Brass - Jewelry Bronze - C22600	800°F to 1450°F +	425°C to 750°C +			87.5% Copper - 12.5% Zinc	
Bronze - from Rio Grande Jewelry Supply ++			Dark red - gray when torch is removed.		92% Copper, 8% Tin. Bronze often develops a copper skin when heated to a certain temperature. Remove with a combination of pickle and hydrogen peroxide.	Melt Temp: 1880°F (1026°C) ++
Copper	700°F-1200°F	371°C - 649°C	Dark red - gray when torch is removed. Colors will move through rainbow colors. Stop at plum/bright red.	Quench immediately	99.9% Copper - depends on how the metal was worked before	Melt Temp: 1981°F (1084°C) &
Fine Silver	440°F to 800°F	204°C - 426°C	No oxides will form. Heat to right below red heat - low cherry red heat. @@	Air cool a bit then quench. @@	99.9% Silver - Overheating will result in an "orange peel" surface. It will also reduce ductility. Trace elements can alter annealing temperature. The lighter the gauge, the lower the temperature. ##	Melt Temp: 1761°F (961°C) &

Gold Filled	950°F - 1100°F for 10 - 15 minutes	510°C - 593°C			Coat with boric acid and alcohol solution or use a commercially available flux to prevent oxidation. Polish darkened areas with metal polish and soft cloth. \$\$	Depends on alloy, treatment, etc. Common metals used as core: silver and brass. Annealing temp. should be close to the core metals.
Gold Yellow - 24K ~~~	392°F	200°C	Black	Quench from black heat. >>	99.99% fine &	See Below Melt Temp: 1945°F (1064°C) &
Gold Yellow - 22K ~~~	1022°F - 1112°F Alternate temperature: 1200°F (649°C) !!! and >>	550°C - 600°C	Dull Red	Any method: quench from red, air cool, quench from black. >>	Depends on what metals alloyed with. ~~~	Melt Temp: 1767°F - 1868°F (964°C - 1020°C)
Gold Yellow - 18K >>	1300°F	704°C	Dull Red	Quench from black heat. >> Quenching while still pink ok. @@	75% gold, 15% silver, 10% copper & Alternative temp: Gold alloys should be held at 1200°F (649°C) for 10 minutes. !!!	Melt Point: 1715°F (936°C) & per Hauser & Miller: 1700°F/927°C &&
Gold Yellow and Green - 14K >>	1300°F	704°C	Dull Red	Yellow - from black heat. Green any method: quench from red, air cool, quench from black. >>	58.33% gold, 8.3% silver, 29.2% copper, 4.17% zinc &	Melt Temp: 1615°F (880°C) &
Gold Yellow and green - 10K	1200°F	649°C	Dull Red	Yellow - from black heat. Green - Air, from black heat or from red heat - any will work. >>	41.666% gold. Balance is copper, silver,	Melt point: Yellow - 1665°F/907°C, Green - 1580°F/860°C \$\$
Gold, White and palladium - 18K	1400°F >>	760°C >>	Cherry Red	Cool to black heat before quenching for maximum malleability. >>		
Gold, White 18K >>	1400°F	760°C	Cherry Red	Quench from black heat. >>		Melting point: White: 1730°F/943°C &&
Gold, Green 18K >>	1300°F	704°C	Between Dull and Cherry Red	Any method: quench from red, air cool, quench from black. >>		Melting point: Green: 1810°F/988°C &&
Gold, Red 18K	1400°F	760°C	Cherry Red	Quench from red heat. >>		Melting point: Red: 1655°F/902°C &&

Gold White and Red 14K >>	1400°F	760°C	Cherry Red	White - quench from black heat. >> Red - Quench from red heat. >>	58.33% gold, 22.1% Copper, 10.8% Nickel, 8.77% Zinc &	Melting point: White: 1825° F/996°C, Red: 1715°F/935°C \$\$
Gold, White and Palladium - 14K	1400°F	760°C	Cherry Red	Cool to black heat before quenching for maximum malleability. >>		Melt Temp: White: 1975F/1079°C - Red 1760°F/960°C \$\$
Gold White - Nickel ~~~	1292°F - 1382°F	700°C - 750°C	Between Dull and Cherry Red		18K - 75% Au, 2.2% Cu, 17.3% Ni, 5.5% Zn ~~~	Liquidis Temp: 1150°C - 1350°C
Gold, White and Red 10K >>	1300°F	704°C	Between Dull and Cherry Red	White - from black heat. Red - Air, from black heat or from red heat - any will work. >>		
Nickel Silver - Alloy 770				Don't quench - air cool.	55% Copper, 18% Nickel, 27% Zinc	Melt Temp: 1960°F (1072°C) &
Platinum	heat for 1-minute per millimeter thickness of material to 1292° F/700°C !!!! Hoover and Strong: 1800° F/982°C >>	700°C or H&S: 982°C >>	Salmon Red	Any method: quench from red, air cool, quench from black. >>	900 Plat/Ir or 950 Plat/RU	Melting point: 3223°F/1773°C \$\$\$ Hauser & Miller 15% Iridium plat. 3310°F/1821° C, 10% Iridium plat. 3250°F/1788° C 5% Iridium plat. 3235°F/1770°C \$\$
Stainless Steel	1900°F	1000+°C	Salmon Red	Hold Salmon color for at least 10 minutes. ??		
Steel			Salmon Red	Cool very slowly. Immersion in coal, cinder or anneal in a firebrick surround.	Various iron and other metals	Melting point - depending on alloy: 1370 degrees C (2500° F) XXX
Sterling Silver	1200°F	649°C	Dull Red	Quench from Black Heat. >> Alternately, 1200° F for 15 minutes — 18ga(.040") .20 minutes in a kiln. >>	92.5% Silver, 7.5% Copper	Melt Temp: 1640°F (894°C) &

Sterling Silver - Hardening	1200°F - See Notes	649°C		Sterling silver can be hardened by first annealing and then heat treating the metal. Anneal at 1200° F and quench. Place in furnace preheated to 600°F (649°C) and heat soak the silver for one hour. <<		
Tin - Pure			Coat with bar soap - heat until soap starts to turn black - or burns. ??		100% Tin	Melt Temp: 450°F (232°C) &
References						
*	Information from Rio Grande					
Rio Argentium	http://media1.riogrande.com/Content/Workir					
Rio Argentium	http://www.riogrande.com/Product/10363					
**	ASTM Standards					
	http://www.astm.org/Standards/B36.1					
***	Asian Copper Information Center					
	http://www.asia.copper.org/acic/faqs.html					
+	ASM Specialty HandBook: Copper and Copper Alloys - Pg. 249					
	http://books.google.com/books?id=sxkPJzmkhnUC&					
++	Rio Grande Jewelry Supply					

	http://www.riogrande.com/Product/6-x-12-Bronze-Sheet-Dead-Soft/134550?Pos=6					
&	IJSinc.com http://www.ijsync.com/file_index/Mv4					
#	Argentium Guild http://argentiumguild.blogspot.com/2011/03/differe					
A	Online Metal Store http://www.onlinemetals.com/show_chems.cfm?pid=12530&temp_ty					
##	Handy & Harman http://reel-to-reel.com/assets/brazing See page two for annealing information					
\$\$	Hauser and Miller http://www.hauserandmiller.com/reference/melti http://www.hauserandmiller.com/fab/goldfilled.html					
~~~	Chochise College http://skywalker.cochise.edu/wellerr/students					
??	Steam Shed http://steamshed.com/annealing%20process.html					
	The Brass World and Plater's Guide					

	http://books.google.com/books?id=q7A6AQAAMAA					
!!!	DHFCO http://www.dhfc.com/pdf/DHF%20Catalog_roll%20harden%20anneal.pdf					
@@	Peter Rowe @ Ganoksin http://www.ganoksin.com/orchid/archive/					
>>	Hoover and Strong http://technical-articles.hooverandstrong.com/wordpress/imp					
##\$	Handy & Harman http://www.handyharmancanad					
XXX	Jefferson Lab http://education.jlab.org/qa/meltingpoint_					
McMaster Carr Pens	http://www.mcmaster.com/#temperature-pens/=od69zy					