Weldability Chart

Pro Spot
welding & joining technologies

	INVAR	KOVAR	MILD STEEL	LEAD	STAINLESS STEEL	TUNGSTEN	SILVER	GOLD	ZINC	MANGANIN	TITANIUM	PLATINUM	INCONEL	TANTALUM	MAGNESIUM	BRONZE	BERYLLIUM COPPER	PHOSPHOR BRONZE	MOLYBDENUM	BIMETAL	COPPER	ALUMINIUM & ALLOYS	YELLOW BRASS (25-40% ZINC)	RED BRASS (10-25% ZINC)	NICKEL & ALLOYS
NICKEL AND ALLOYS	U CCZ CCZ g	U CCZ CCZ g	G CCZ CCZ a	U CCZ CCZ bc	G A940 CCZ b	U CCZ CCZ e	P Si CCZ bc	U Mo CCZ bc	P CCZ CCZ d	P CCZ CCZ bc	P A940 CCZ bc	G Mo CCZ bc	G CCZ CCZ bc	P CCZ CCZ bc	U CCZ CCZ bc	G CCZ CCZ bc	G CCZ CCZ bc	G CCZ CCZ bc	P CCZ CCZ bc	G CCZ CCZ bc	G Mo CCZ bc	U CCZ CCZ bc	P CCZ CCZ bc	U CCZ CCZ bc	G CCZ CCZ bc
RED BRASS (10-25% ZINC)	P CCZ CCZ g	P CCZ CCZ g	U CCZ CCZ bc	U CCZ CCZ bc	U A940 CCZ bc	U CCZ CCZ e	P Si CCZ bc	U Mo CCZ bc	P CCZ CCZ bc	P CCZ CCZ bc	P A940 CCZ bc	G Mo CCZ bc	P CCZ CCZ bc	P CCZ CCZ bc	P CCZ CCZ f	G CCZ CCZ bc	G CCZ CCZ bc	U CCZ CCZ bc	U CCZ CCZ bc	G CCZ CCZ bc	G A940 CCZ bc	U CCZ CCZ bc	U CCZ CCZ bc	P CCZ CCZ bc	
YELLOW BRASS (25-40% ZINC)	P CCZ CCZ g	P CCZ CCZ g	P CCZ CCZ be	U CCZ CCZ bc	U A940 CCZ b	U CCZ CCZ e	U Si CCZ bc	U Mo CCZ bc	P CCZ CCZ bc	P CCZ CCZ bc	P A940 CCZ bc	G Mo CCZ bc	P CCZ CCZ bc	P CCZ CCZ bc	P CCZ CCZ f	G CCZ CCZ bc	P CCZ CCZ bc	P CCZ CCZ bc	P CCZ CCZ bc	G CCZ CCZ bc	G Mo CCZ bc	P CCZ CCZ bc	G CCZ CCZ bc		
ALUMINIUM & ALLOYS	U CCZ CCZ d	U CCZ CCZ d	U CCZ CCZ d	U CCZ CCZ bcd	U CCZ CCZ bcd	U CCZ CCZ de	E Si CCZ ed	G Mo CCZ bd	P CCZ CCZ d	U CCZ CCZ d	U A940 CCZ d	U Mo CCZ ed	U CCZ CCZ d	U CCZ CCZ d	P CCZ CCZ d	U CCZ CCZ d	P CCZ CCZ d	P CCZ CCZ d	U CCZ CCZ fe	U CCZ CCZ e	G Mo CCZ d	G CCZ CCZ dbc			
COPPER	G CCZ A940 bc	G CCZ A940 bc	P CCZ Mo e	U CCZ Mo e	P A940 Mo bc	P CCZ Mo bc	G Mo Mo bc	P CCZ CCZ bc	P CCZ Mo bc	P CCZ Mo bc	P A940 Mo bc	G Mo Mo bc	P CCZ Mo bc	P CCZ Mo bc	P CCZ Mo bc	G CCZ Mo bc	G CCZ Mo bc	G CCZ Mo bc	U CCZ Mo bc	G CCZ Mo bc	G Mo Mo bc				
BIMETAL	P CCZ CCZ bc	P CCZ CCZ bc	G CCZ CCZ a	U CCZ CCZ bc	P A940 CCZ e	P CCZ CCZ fg	P Si CCZ e	U Mo CCZ g	U CCZ CCZ g	P CCZ CCZ g	P A940 CCZ g	P Mo CCZ g	P CCZ CCZ g	P CCZ CCZ g	U CCZ CCZ g	G CCZ CCZ bc	G CCZ CCZ bc	G CCZ CCZ bc	P CCZ CCZ bc	G CCZ CCZ bc					
MOLYBDENUM	U CCZ CCZ g	U CCZ CCZ g	P CCZ CCZ e	U CCZ CCZ ge	P A940 CCZ eg	P Mo CCZ gi	P Si CCZ g	U Mo CCZ g	P CCZ CCZ g	P CCZ CCZ bc	P CCZ CCZ bcg	P Mo CCZ bcg	P CCZ CCZ bcg	P CCZ CCZ bcg	U CCZ CCZ fg	U CCZ CCZ bcg	P CCZ CCZ bc	P CCZ CCZ bc	P CCZ CCZ e						
PHOSPHOR BRONZE	P CCZ CCZ bc	P CCZ CCZ bc	P CCZ CCZ bc	P CCZ CCZ d	U A940 CCZ g	P CCZ CCZ g	G Si CCZ bc	U Mo CCZ bc	U CCZ CCZ fd	U CCZ CCZ bc	P CCZ CCZ bc	G Mo CCZ bc	P CCZ CCZ bc	U CCZ CCZ bc	P CCZ CCZ f	U CCZ CCZ bc	G CCZ CCZ bc	G CCZ CCZ bc							
BERYLLIUM COPPER	P CCZ CCZ bc	P CCZ CCZ bc	U CCZ CCZ bc	U CCZ CCZ d	U CCZ CCZ bc	P CCZ CCZ bc	G Si CCZ bc	G CCZ CCZ bc	P CCZ CCZ d	P CCZ CCZ bc	G CCZ CCZ bc	G Mo CCZ bc	P CCZ CCZ bc	P A940 CCZ bc	P CCZ CCZ fd	G CCZ CCZ bc	G CCZ CCZ bc								
BRONZE	P CCZ CCZ bc	P CCZ CCZ bc	P CCZ CCZ d	U CCZ CCZ bcd	P A940 CCZ bc	P CCZ CCZ bc	G Mo CCZ bc	U CCZ CCZ bc	P CCZ CCZ bc	P CCZ CCZ bc	P A940 CCZ bc	G Mo CCZ bc	P CCZ CCZ bc	P A940 CCZ bc	P CCZ CCZ bc	G CCZ CCZ bc									
MAGNESIUM	U CCZ CCZ g	U CCZ CCZ g	U CCZ CCZ f	U CCZ CCZ d	U A940 CCZ f	U CCZ CCZ f	U Si CCZ bc	U CCZ CCZ bc	U CCZ CCZ d	U CCZ CCZ bc	U A940 CCZ bc	P Mo CCZ bc	U CCZ CCZ e	P CCZ CCZ bc	G CCZ CCZ f										
TANTALUM	P CCZ CCZ gf	P CCZ CCZ gf	P CCZ CCZ gf	U CCZ CCZ d	P A940 CCZ gf	P CCZ CCZ bc	P Si CCZ bc	U CCZ CCZ bc	P CCZ CCZ bcd	P CCZ CCZ bc	P A940 CCZ bc	P Mo CCZ bc	P CCZ CCZ bc	G CCZ CCZ bc											
INCONEL	P CCZ CCZ bc	P CCZ CCZ bc	G CCZ CCZ bc	U CCZ CCZ d	P A940 CCZ bc	P CCZ CCZ bc	P Si CCZ bc	U CCZ CCZ bc	U CCZ CCZ bcd	P CCZ CCZ e	P CCZ CCZ e	P Mo CCZ bc	G CCZ CCZ e												
PLATINUM	P CCZ Mo g	P CCZ Mo g	P CCZ CCZ bc	U CCZ CCZ d	P A940 Mo bc	P CCZ Mo bc	G Si Mo bc	U CCZ CCZ bc	P CCZ CCZ d	P CCZ Mo bc	P A940 Mo bc	P Mo Mo bc													
TITANIUM	P CCZ A940 g	P CCZ A940 g	P CCZ A940 bc	U CCZ A940 bc	P A940 A940 bc	P CCZ A940 bc	P Si CCZ bc	U CCZ A940 bc	P CCZ A940 dbc	P CCZ A940 bc	G A940 A940 bc														
MANGANIN	U CCZ CCZ ge	U CCZ CCZ ge	P CCZ CCZ bc	U CCZ CCZ d	U A940 CCZ e	U CCZ CCZ bc	P Si CCZ bc	U CCZ CCZ bc	P CCZ CCZ e	G CCZ CCZ bc															
ZINC	U CCZ CCZ ge	U CCZ CCZ ge	P CCZ CCZ bc	U CCZ CCZ d	U CCZ CCZ d	P CCZ CCZ de	P Si CCZ d	U CCZ CCZ g	P CCZ CCZ d																
GOLD	G CCZ CCZ hbc	G CCZ CCZ e	P CCZ CCZ e	U CCZ CCZ e	P A940 CCZ ge	U CCZ CCZ ge	P Si CCZ hge	G CCZ CCZ bc																	
SILVER	P CCZ Si hbc	P CCZ Si hbc	U CCZ Si bc	U CCZ Si d	U A940 Si g	U A940 Si g	P Si Si hg																		
TUNGSTEN	U CCZ CCZ g	U CCZ CCZ g	P CCZ CCZ bc	U CCZ CCZ dg	P A940 CCZ g	P Mo CCZ Mo CCZ gh																			
STAINLESS STEEL	P CCZ A940 bc	P CCZ A940 bc	G CCZ CCZ a	U CCZ CCZ dg	E A940 A940 b																				
LEAD	U CCZ CCZ bcd	U CCZ CCZ bcd	U CCZ CCZ bcd	U CCZ CCZ bcd																					
MILD STEEL	P CCZ CCZ g	P CCZ CCZ g	E CCZ CCZ a																						
KOVAR	G CCZ CCZ bc	G CCZ CCZ bc																							
INVAR	G CCZ CCZ bc																								

ADDITIONAL GUIDANCE

a	Wide range of Settings
b	Heavy Current, Short Time
c	Synchronous Welding Control Required
d	Frequent Electrode Cleaning Required
e	Low Mechanical Weld Strength
f	Inconsistent Weld Results
g	Difficult Combination
h	Light Thicknesses of Material
i	Embrittlement Occurs - May require Post Heat Treatment

ELECTRODE MATERIAL GUIDANCE

CCZ	Copper Chrome Zirconium Alloy
A940	Copper Nickel Silicon Dispersion Hardened Alloy
Mo	Molybdenum - Can often be substituted by Tungsten
Si	Silver

WELDABILITY GUIDE

E	Excellent
G	Good
P	Poor
U	Unsatisfactory