

WELDING OF DISSIMILAR METALS

At times, due to engineering design, it will be required that two, or in some cases more, dissimilar materials are to be joined by welding.

It is essential that the two materials be identified and wherever possible the design criteria be obtained, eg. elevated temperatures, chemical environment or wear by abrasion, etc.

Often it is not possible to obtain the base material analysis as in the case of maintenance or repair and it is left to the welding operator to select a consumable and a procedure purely based on his or her previous experience.

Welding Recommendations (refer to Table 1. on the next page)

- A. One common combination of materials is stainless steel to mild steel and this combination can be successfully welded with a 309 type consumable. Both manual metal arc electrodes and gas metal arc wires are available.
- B. Should the stainless steel be of a heat resisting type, such as the 310 variety, then a 310 consumable is recommended. These 310 materials resist oxidation up to 1,200° C, making them ideal for furnace applications associated with the oil, metal and ceramic refining industries. The decision to use these materials is usually specified by the welding engineer.
- C. When welding cast iron to mild steel and possibly stainless steel, a nickel-iron consumable such as Castcraft 55 electrode or Nicore 55[®] flux core wire is often recommended.
- D. When welding steel to copper/brass select a consumable that is most compatible with the grade of copper/brass. Autocraft Silicon Bronze gas metal arc welding wire is commonly used with many copper alloy grades.
- E. For cast iron to copper/brass, select a consumable most suited to the copper alloy rather than the cast iron. A procedure commonly used is to butter the surface of the cast iron with Castcraft 55/Nicore 55[®], then use either Bronzecraft AC/DC or Autocraft Silicon Bronze to complete the joint.
- F. A material that is not commonly used, but is chosen in high chemical attack applications, is Monel. This material can be welded to mild steel by using a E NiCu-B electrode. It may be necessary to butter the mating surface of the mild steel with a E NiCu-B electrode prior to the joining of the two materials.

Refer to Table 1 on the next page for details regarding various welding consumables to join dissimilar metals.

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Table 1. Welding Consumables for Joining Dissimilar Metals

Material 1	Material 2	Welding Recommendations*	MMAW	GMAW	FCAW	Gas & TIG Welding
Mild Steel	Stainless Steel	A	Saticrome 309Mo-17 Weldall	Autocraft 309ISI	Shieldcrome 309LT	Not recommended
Mild Steel	Cast Iron	C	Castrcraft 55	N/A	Nicore 55®	Comweld Mang. Bronze or Comweld Nickel Bronze
Mild Steel	Copper	D	Bronzecraft AC/DC	Autocraft Silicon Bronze	N/A	Comweld Mang. Bronze or Comweld Nickel Bronze
Cast Iron	Copper/Brass	E	* Bronzecraft AC/DC * Castrcraft 55	* Autocraft Silicon Bronze * Nicore 55®	N/A	Comweld Mang. Bronze or Comweld Nickel Bronze
Mild Steel	Austenitic Manganese	-	Austex	Autocraft 309ISI	Shieldcrome 309LT	Not recommended
Mild Steel	Monel	F		N/A	N/A	N/A

* See welding recommendations A, B, C, etc; on the previous page.