J. KITTREDGE & SONS, INC.

March 22, 2004

Re: Dip Brazing Specifications

Dear Valued Customer:

The purpose of this letter is to address recent changes in military specifications of aluminum dip brazed products. The aluminum dip-brazed industry has begun to adopt the AWS C3.7 brazing specification due to the military adding MIL-B-7883 to their obsolete listing. We want to discuss the specifications in general, what changes are involved, and what affects these changes have on dip-brazed procedures.

MIL-B-7883 is a viable specification but will not be kept up or changed by the government. It is widely used and has been revised over the years to include all of the information needed to meet the standards set forth by the military. It is concise and clear on all issues and covers all aspects of brazing. What needs to be understood is that it still can be specified on new and old projects and is the specification of choice.

AWS C3.7 is also a viable specification that covers all aspects of aluminum dip brazing. It has been revised a couple of times but still is in need of change. It has been presented as the direct replacement to MIL-B-7883. The AWS C3.7 specification is different in many ways to MIL-B-7883. The differences are somewhat confusing and are in need of clarification.

Some of our customers have recognized the problems with AWS C3.7 and due to their policies against referencing obsolete specifications have been forced into writing a braze specification of their own. This is one way of handling the problem but obviously referencing MIL-B-7883 is the choice of most.

The biggest difference between the two specifications is how the process is controlled and the brazed parts qualified. The MIL-B-7883 specification revolves around the premise that a controlled process and a qualified assembly utilizing the controlled process will yield consistent results. The AWS C3.7 specification revolves around the belief that a controlled process and the application of qualified BPS (brazing procedure specifications) will yield consistent results.

The BPS's are generic brazed and tested samples of each individual braze joint configuration. What needs to be understood is that qualified BPS's do not represent the braze joints as applied within a given assembly. The assembly brazing process is affected by many variables that will influence the final procedure. These variables consist of assembly and fixture mass, assembly and fixture geometry, grade of braze and final assembly heat treat conditioning. As one can see applying generic BPS's procedures cannot represent the brazed assembly due to the adjustments required to control these variables. Simply put, brazed sample coupons, processed per a BPS, will require a completely different procedure than a brazed assembly that has the given joint within the assembly. Both will arrive at the specified joint quality.

Another difference that is also important to point out that the AWS C3.7 specification put the onus on the "Organization Having Quality Responsibility" to approve all brazing procedures and processes performed by their suppliers before they are used. The "Organization Having Quality Responsibility" is defined as final product manufacturer in the commercial market and prime contractor in the military market. In contrast, MIL-B-7883 defines the process, how the process is controlled, and final product quality. There are no approvals required just certifications by the supplier that all aspects of the specification whether process control or final brazed assembly quality is met.

The grade "B" x-ray requirement is another overlooked difference between the specifications. AWS C3.7 imposes the x-ray where MIL-B-7883 does not. A sample AWS drawing callout to be consistent with MIL-B-7883 would be as follows:

Aluminum dip-braze IAW AWS C3.7, Grade B, less x-ray. Filler metal IAW AWS A5.8.

There are numerous other differences outlined in the attached document that require attention. We have incorporated the proper controls and procedures to accommodate these differences where possible. We have taken exception in areas that are not possible or feasible. These procedures are and have been in place to control our process for some time now. They are available for review to all of our customers but are considered proprietary.

The last issue pertains to our COC (certification of compliance) relative to the AWS C3.7 specification. We will provide the certification with exception to the issues defined within the body of this letter and the attached document only. The conflict between the specification and the real world brazing process prohibits our overlooking this matter.

Please review the attached document and forward a copy to your engineering staff. Feel free to contact me directly with any questions or concerns. I would appreciate acknowledgement, written or email, that you have received this information and possibly what we can do to help in any way to resolve issues relative to this information.

Sincerely,

David R. MacLeod
Engineering/Marketing Manager
J. Kittredge & Sons, Inc.

Tel. (978) 567-0998 x224
Email: dave-mac@jkittredge.com