What Does 'Certified' Brazer Really Mean?

The importance of qualifying brazers to an industry standard is outlined

BY ROBERT HENSON AND WALTER J. SPERKO

Qualification test specimen showing complete fill of a brazed joint.

Many firms want their brazers to be certified because it lends credibility to the brazing department and provides assurance about braze quality. While your brazers may be skilled, can they be "certified"? The term can mean different things to different people and, often, the designation is misapplied.

When a brazer is tested, the testing protocol should follow a standard such as American Welding Society (AWS) B2.2, *Specification for Brazing Procedure and Performance Qualification*, or American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code*, Section IX. After passing a test prescribed in a standard, the brazer becomes qualified to that standard. The manufacturer or the testing agency documents the conditions of the test on a record. The manufacturer or agency conducting the tests certifies, by signature, that the tests were conducted in accordance with the applicable standard and the test conditions are a true record of what the brazer did — Fig. 1. Through this process, an organization **certifies** that the brazer is **qualified**.

When someone asks for a "certified" brazer, what the person really should be asking for is a "qualified" brazer because qualification, according to AWS B2.2, is "one who is qualified to the requirements of this specification to perform manual brazing."

We're featuring B2.2 in this article, but this approach also applies to ASME Section IX and other qualification documents like ISO 13585. While these standards cover various brazing processes, this article refers to manual brazing using an oxyfuel torch.

Brazing Procedure Specifications

Before an organization can qualify a brazer, it must first develop a written Brazing Procedure Specification (BPS). The BPS includes information about the part's design and brazing conditions. Testing appropriate brazed parts is done to confirm the procedure will produce brazed joints that meet strength or other established service requirements.

Once the BPS has been written, qualified brazers can be tested to ensure they can produce brazed joints that meet the requirements of the applicable standard.

According to B2.2, "Brazer performance qualification tests determine the ability of brazers to make sound brazed joints following a Brazing Procedure Specification (BPS), and under conditions that will be encountered in production assemblies."

Brazer Performance Testing

Brazer performance testing is how brazers become qualified. This qualification is specific to the joint parameters in the BPS. This includes designated filler metal, base metal, joint design, material thickness, part clearance, and brazing position. To avoid being too restrictive, standards acknowledge similarities between groups of base and filler metals, and provide some latitude for part variations from the exact conditions used during brazer testing.

If there are changes outside the parameters for which the brazer is qualified, the brazer must requalify. B2.2 lists qualification variables that dictate when this occurs.

BRAZING PERFORMANCE QUALIFICATION RECORD

Name: Jack Harris ID: Employee # 23456

Date: February 14, 2016 BPS Number: 107-1, Rev 6

Brazing Process: Torch, Manual Brazer ☒ Operator ☐

TEST BRAZEMENT

Base Metal #1 ID: ASTM B-111 C10200 BM No. 300 BM T: 0.080 in.

Base Metal #2 ID: ASME B16.22 C10200 BM No. 300 BM T: 0.051 in.

Filler Metal ID: AWS A5.8 BCuP-7 FM No. 110 FM Feed: Face Fed

Test Position: Horizontal and Vertical Upflow Joint Type: 1-1/2 inch Socket; 0.109 inches deep

Other: Tube fully inserted into socket.

TEST RESULTS

Specimen No.	VISUAL	Pass	Fail
Horiz 1	In accordance with B2.2, paragraph 5.3.2	X	
Horiz 2	In accordance with B2.2, paragraph 5.3.2	X	
V–Upflow 1	In accordance with B2.2, paragraph 5.3.2	X	
V–Upflow 2	In accordance with B2.2, paragraph 5.3.2	X	

Specimen No.	MACROETCH OR PEEL Remarks	Pass	Fail
Horiz 1	Macroetch 5% unbrazed, B2.2 paragraph 5.3.3	X	
Horiz 2	Macroetch 10% unbrazed B2.2 paragraph 5.3.3	X	
V–Upflow 1	Macroetch 0% unbrazed B2.2 paragrap 5.3.3	X	
V–Upflow 2	Macroetch 5% unbrazed B2.2 paragraph 5.3.3	X	

QUALIFIED FOR

Brazing Process: Torch, Manual Position: All

BM #1 No: 300 BM #1 T: 0.030 to 0.120 BM #2 No. 300 BM #2 T: 0.025 to 0.102

FM Number: 110 FM Feed Face Fed

Joint Type: Socket up to 1.36 inches deep

Other:

The above named individual is qualified in accordance with in accordance with the requirements of AWS B2.2/B2.2M:2015, *Specification for Brazing Procedure and Performance Qualification.*

Date 1/28/16

Approved by S.L. Clemens Title Q.A. Manager

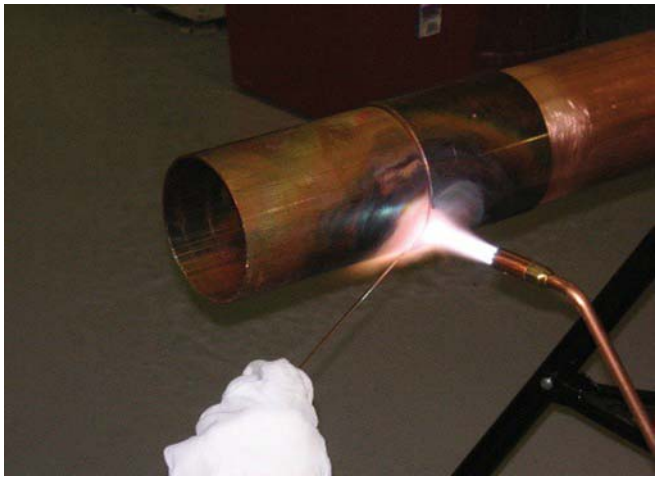
Fig. 1 — An example of a brazing performance qualification record.

For example, AWS B2.2 groups base metals by similar composition using a BM prefix. A change from BM 300 brass Alloy C23000 to BM 300 brass Alloy C26000 does not require requalification. However, a change from one of these base metals to BM 310, Alloy C90700 does.

B2.2 groups filler metals in a similar manner using filler metal (FM) numbers. Each number contains A5.8 product classifications. Most of the popular BAg silver brazing alloys are included in FM group 110. Alloys in the copper/phosphorus family are grouped under FM 150. So, for example, a change from BCuP-5 to BCuP-3 doesn't require requalification. On the other hand, if you were brazing C70600 (copper-nickel, 10%) with BAg-24 and changed to BCuP-5, you would need to requalify your brazer. That is because you've changed FM numbers from 110 to 150.

Other conditions present during the test limit what the brazer may do in production. For example, qualification on plate qualifies pipe, but not vice versa. Increasing the overlap length more than 25% from the overlap used on the test coupon requires requalification, but a decrease does not because a shorter overlap is easier to braze than a longer one. Increasing the part thickness beyond twice the test coupon thickness requires addi-

Manual brazing of a pipe using an oxyfuel torch.



A 4-in.-diameter copper tube brazing performance qualification test specimen.

tional testing of the brazer, as does certain changes in the flow position.

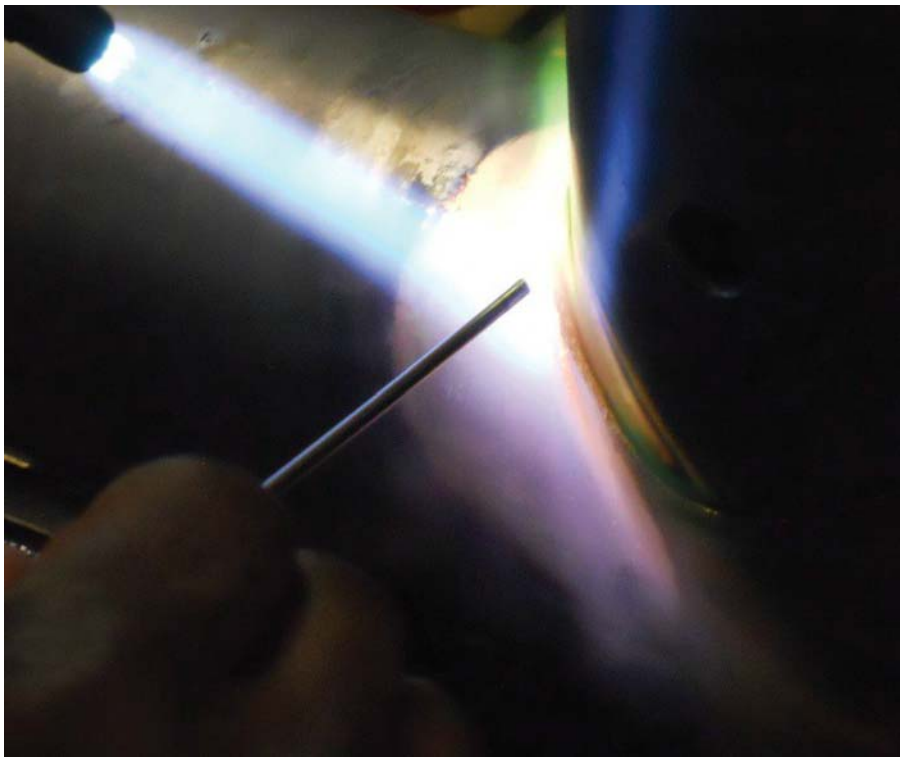
Testing Requirements

Specific braze joint testing requirements are included in B2.2. Test parts are workmanship or production samples, either visual tests to section 5.3.2 of the specification, or specimen tests, (section and macro etch to section 5.3.3 or peel test to section 5.3.4).

It's important to point out that following the test standards listed above does not make the brazer qualified on every brazed part the company might produce. It only applies to those parts that conform to conditions listed in the performance qualification document.

Who Can Administer the Test?

Another common question asks who can administer these tests. Manufacturers can qualify their own brazers; an independent test agency is not required. The brazer qualification record that documents the testing should name the person or persons (the "qualifier") who conducted and supervised the tests. It makes sense that this person should have brazing experience and thoroughly understand the testing process and relevant documents. Many companies prefer a third-party approach to this as they feel it removes any possible internal bias. From a marketing standpoint, customers may believe third-party testing lends more credibility to the process.



Manual oxyfuel brazing of a pipe.

Summary

Qualification following a recognized industry standard establishes the organization performed due diligence, which is important in the case of a part failure in service. Equally important, experience has shown that developing a brazer testing program to an accepted industry standard is an excellent method for improving braze quality. WJ

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