Case N-882
Alternative Requirements for Attaching Nonstructural Electrical Connections to Class 2 and 3 Components
Section XI, Division 1

Inquiry: As an alternative to IWA-4440, is it permissible to use pin brazing\(^1\) to attach copper or copper alloy nonstructural electrical connectors to pressure-retaining components for applications such as cathodic protection and grounding?

Reply: It is the opinion of the Committee that, in lieu of the requirements of IWA-4440, pin brazing may be used for brazing copper or copper alloy temporary attachments and permanent nonstructural attachments under the following conditions.

1 GENERAL REQUIREMENTS

(a) This Case applies to components with base materials listed as P-No. 101 for brazing and limited to those designated P-No. 1 for welding.

(b) The provisions of this Case apply to Class 2 or 3 components whose maximum operating temperature does not exceed 200°F (95°C) and whose maximum operating pressure does not exceed 275 psig (1.9 MPa).

(c) Temporary attachments are removed in accordance with [NC-4435(b) or ND-4435(b)].

(d) The method used to prepare the base metal shall leave the braze preparation with reasonably smooth surfaces. The surfaces for brazing shall be free of scale, rust, oil, grease, and other deleterious material. The work shall be protected from deleterious contamination and from rain, snow, and wind during brazing. Brazing shall not be performed on wet surfaces.

2 BRAZING QUALIFICATIONS

This Case number shall be listed on the qualification records.

2.1 PROCEDURE QUALIFICATION

(a) Pin brazing shall be qualified by performance of ten pin braze tests using the same equipment, brazing material (i.e., capsule type), connector type (i.e., size, shape, and material), and position as will be used in production. The pin brazing equipment shall be completely automatic except for starting. Any change to the listed variables requires requalification.

(b) Each of the ten brazed connections shall be tested by bending or hammering until the original brazed connection has been bent by at least 45 deg.

(c) In order to pass the test, each of the ten brazed connections shall show no more than 50% visible separation or fracture after bending.

2.2 PERFORMANCE QUALIFICATION

Each brazing operator who prepares acceptable Brazing Procedure Specification (BPS) qualifications is thereby qualified under the essential variables of QB-351.2. Alternatively, each brazing operator shall successfully pin braze five samples meeting the acceptance criteria for BPS qualification.

3 BRAZING PROCEDURE SPECIFICATION REQUIREMENTS

The brazing procedure shall include the following information on the BPS:

(a) base metal P-No.

(b) positions qualified

(c) equipment description

(d) connector type (size, shape, material)

(e) brazing material (capsule type)

\(^1\) The term \textit{pin brazing} is defined as an automatic brazing process that uses heat from resistance to electric current at the interface between the pin capsule and the workpiece, and then an arc between the pin capsule and the outside surface of the electrical connector to melt the pin capsule that contains brazing filler metal.

The Committee’s function is to establish rules of safety, relating only to pressure integrity, governing the construction of boilers, pressure vessels, transport tanks and nuclear components, and in-service inspection for pressure integrity of nuclear components and transport tanks, and to interpret these rules when questions arise regarding their intent. This Code does not address other safety issues relating to the construction of boilers, pressure vessels, transport tanks and nuclear components, and the in-service inspection of nuclear components and transport tanks. The user of the Code should refer to other pertinent codes, standards, laws, regulations or other relevant documents.