CHAPTER 4

FLUXES AND ATMOSPHERES

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Reviewer
R. L. Peaslee
Wall Colmonoy Corporation

Photograph courtesy of CTP Company
Fluxes are a mixture of chemicals that are used to (1) hinder or prevent the formation of oxides and other undesirable substances in molten brazing filler metal and on solid base metal surfaces and (2) dissolve or otherwise facilitate the removal of such substances. The purpose of brazing flux is to promote the formation of a brazed joint by protecting the base metal and the brazing filler metal from oxidation. By removing the surface oxides, the brazing flux reduces surface tension and promotes the free flow of the brazing filler metal. Accordingly, a gas or vacuum atmospheres are fluxes that can be used to surround the work and provide an active or inert protective atmosphere. For this reason, both fluxes and atmospheres are discussed in this chapter. However, because their methods of application and characteristics are quite different, fluxes and atmospheres are discussed in separate sections.

For example, in the designation “FB3-C,” the letters “FB” indicate the flux is for brazing or braze welding, the number “3” designates the type of base metal (see Table 4.1), and the letter “C” indicates the suitable brazing filler metal and the active temperature range (see Table 4.1).

**PRINCIPLES OF OPERATION**

When metals are exposed to air, chemical reactions occur. The rate of these reactions is generally accelerated as the temperature increases. The most prevalent reaction leads to formation of oxides, though nitrides and even carbides are formed in some instances. The rate of oxide formation varies with each metal composition and the nature of the oxide. Oxide tenacity, structure, thickness, resistance to removal, and further oxidation are all factors that need consideration. On some metals, such as aluminum, oxide formation in air occurs instantaneously even at or below room temperature. In most conditions, surface oxides or other compounds create barriers to the formation of brazed joints.

In producing a braze, the flux is often needed to combine with, remove, or dissolve the undesirable residual compounds or products of the brazing operation, which would otherwise impair brazing filler metal flow. It should be noted that fluxes are not designed or intended for the primary removal of oxides, coatings, oil, grease, dirt, or other foreign materials from the detail parts to be brazed. Prior to brazing, all detail parts must be subjected to the appropriate cleaning operations as dictated by the particular metals being used.\(^1\)

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\(^1\) For further information, see Chapter 5, “Precleaning and Surface Preparation.”