Recommended Practices for Plasma-Arc Welding
RECOMMENDED PRACTICES FOR PLASMA-ARC WELDING

Prepared by
AWS Arc Welding and Arc Cutting Committee

Under the Direction of
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1. Scope

1.1 These recommended practices present a description of the plasma-arc welding process and practical procedures as applied to joining parts and surfacing. These discussions apply to a wide variety of metals and represent methods used in industry.

2. Definitions of Terms*

2.1 General. Some of the terms used in describing plasma-arc welding are the same as those used in gas tungsten-arc welding. Other terms listed are peculiar to the plasma-arc welding process. Many of these terms are shown in Fig. 1.

2.2 Plasma arc. A plasma—a gas heated to a condition of at least partial ionization that is capable of conducting electric current—exists during any arc occurrence. In nature, the gas ionized by a lightning bolt constitutes a plasma. The same ionization phenomenon occurs in welding arcs, carbon-arc lights, and arc furnaces. In recent years, however, the expression “plasma arc” has become associated with those processes employing a constricted arc. Arc constriction is brought about by forcing the arc to pass through a small nozzle or opening as it passes from the electrode to the workpiece.

2.3 Plasma-arc welding. An arc welding process wherein coalescence is produced by heating with a constricted arc between an electrode and the workpiece (transferred arc) or the electrode and the constricting nozzle (nontransferred arc). Shielding is obtained from the hot, ionized gas issuing from the orifice which may be supplemented by an auxiliary source of shielding gas. The shielding gas may be inert or a mixture of gases. Pressure may or may not be used, and filler metal may or may not be supplied.

2.4 Constricted arc. An arc column shaped by a constricting nozzle orifice.

2.5 Constricting nozzle. A water-cooled copper nozzle surrounding the electrode and containing the constricting orifice.

2.6 Constricting orifice. The hole in the nozzle through which the arc passes.

2.7 Double arcing. A condition in which the main arc does not pass through the constricting orifice but transfers to the inside surface of the nozzle. A secondary arc is simultaneously established between the outside surface of the nozzle and the workpiece. Double arcing usually damages the nozzle.

*For AWS terms and definitions, refer to the latest edition of publication AWS A3.0, Terms and Definitions. Please note that some of the terms and definitions used in this publication are not included in AWS A3.0. They are either new terms defined after the last revision of A3.0 or they are used to clarify this publication.