

The Practical Reference Guide to Positioning

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Basic Safety Precautions

Burn Protection. Molten metal, sparks, slag, and hot work surfaces are produced by welding, cutting, and allied processes. These can cause burns if precautionary measures are not used. Workers should wear protective clothing made of fire-resistant material. Pant cuffs, open pockets, or other places on clothing that can catch and retain molten metal or sparks should not be worn. High-top shoes or leather leggings and fire resistant gloves should be worn. Pant legs should be worn over the outside of high-top shoes. Helmets or hand shields that provide protection for the face, neck, and ears, and a head covering to protect the head should be used. In addition, appropriate eye protection should be used.

Electrical Hazards. Electric shock can kill. However, it can be avoided. Live electrical parts should not be touched. The manufacturer's instructions and recommended safe practices should be read and understood. Faulty installation, improper grounding, and incorrect operation and maintenance of electrical equipment are all sources of danger. All electrical equipment and the workpiece should be grounded. The workpiece lead is not a ground lead. It is used only to complete the welding circuit. A separate connection is required to ground the workpiece. The workpiece should not be mistaken for a ground connection.

Fumes and Gases. Many welding, cutting, and allied processes produce fumes and gases which may be harmful to health. Avoid breathing the air in the fume plume directly above the arc. Do not weld in a confined area without a ventilation system. Use point-of-welding fume removal when welding galvanized steel, zinc, lead, cadmium, chromium, manganese, brass, or bronze. Do not weld on piping or containers that have held hazardous materials unless the containers have been properly made inert.

Compressed Gas Cylinders. Keep caps on cylinders when not in use. Make sure that gas cylinders are chained to a wall or other structural support. Do not weld on cylinders.

Radiation. Arc welding may produce ultraviolet, infrared, or light radiation. Always wear protective clothing and eye protection to protect the skin and eyes from radiation. Shield others from light radiation from your welding operation.

Special Precautions. In the following conditions when welding aluminum alloys: (1) High levels of fumes are produced when using the 5XXX (magnesium-bearing) aluminum filler metals. (2) The use of argon-based shielding gas blends results in the production of ozone, especially with 4XXX filler metals. The use of filtering masks or airline respirators will be required if it is determined that personnel are being exposed to excessive pollutants. Caution must also be observed in the reaction between aluminum and certain solvents and cleaners. Consult information provided by manufacturers for the necessary safe practices in the use of their products. AWS also recommends a personal copy of "Arc Welding Safely", "Fire Safety in Welding and Cutting", and "Safety in Welding, Cutting, and Allied Processes".

AWS publications may be purchased from the American Welding Society at <http://www.aws.org> or by contacting the AWS at 800-854-7149.

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I. INTRODUCTION

This Practical Reference Guide describes the basic operation of weldment positioners and welding head manipulators and gives information on their selection and use. Weldment positioners hold and move a workpiece into the desired positions for welding and other related operations. Welding head manipulators hold and move the welding head and welding torch as the weld is made. Positioners and welding head manipulators can be used individually and in combination with each other or with other equipment for manual, semi-automatic, mechanized, automated, or robotic welding operations. Weldment positioners and welding head manipulators are particularly useful to reduce operator fatigue, increase welding speed, and reduce production time for long weld joints, circumferential joints, and thick joints that require multiple weld passes. They can help improve productivity, reduce costs, and improve weld quality.

CAUTION: THIS DOCUMENT INCLUDES GUIDELINES FOR THE OPERATION, SELECTION AND USE OF WELDMENT POSITIONERS AND WELDING HEAD MANIPULATORS. CALCULATIONS OF LOADS AND FORCES ON EQUIPMENT AND DESIGN OF MOUNTING METHODS FOR EQUIPMENT, TOOLING, AND WORKPIECES ALWAYS SHOULD BE DONE BY A QUALIFIED ENGINEER OR BY THE MANUFACTURER OF THE EQUIPMENT.

II. WELDMENT POSITIONING EQUIPMENT

Positioners are mechanical devices that support and move a workpiece to the desired position for welding and other related operations. Positioning equipment is available in a number of configurations, depending on the motions required to properly position the work. Weldment positioning equipment includes the following types:

- ☐ Balancing positioners that are designed to permit manual movement of the workpiece. (See section: II.G.)
- ☐ Tilting-rotating positioners provide two powered axes of motion. (See section: II.B.)
- ☐ Powered elevation positioners add powered vertical motion to tilting and rotation motions of the table. (See section: II.C.)
- ☐ Drop-center tilting positioners are specially designed so that the surface of the table is along or below the tilt axis. (See section: II.D.)
- ☐ Turntable positioners have tables that rotate about a vertical axis but do not tilt. (See section: II.E.)
- ☐ Headstock and tailstock positioners provide motion to rotate a workpiece about a horizontal axis and do not tilt. (See section: II.F.)
- ☐ Turning rolls hold and turn cylindrical parts about their horizontal axis. (See section: III.)