



## RESISTANCE SPOT WELDING

### INTRODUCTION

Resistance Spot Welding is one of the oldest of the electric welding processes in use by industry. The weld is made by a combination of heat, pressure, and time. As the name implies, it is the material's resistance to current flow that causes a localized melting in the part. Pressure is exerted by the electrodes and tips. Time needed is determined by material thickness and type, amount of current, and cross-sectional area of the welding tips and contact surfaces.

### HOW THE PROCESS WORKS

Fundamentally, Resistance Spot Welding occurs when current flows through the tips and the separate pieces of metal to be joined. The resistance of the base metal to the electrical current causes localized heating, and the weld is made. The weld is unique because the weld nugget is formed internally with relation to the surface of the base metal. An arc spot weld, on the other hand, starts at the surface of one piece and penetrates into the second piece to form the weld nugget. The arc weld is made from one side only. The resistance spot weld is normally made with electrodes that press both sides of the workpieces.

### SAFETY HAZARDS

Resistance Spot Welding is not an open-arc process. The weld is made inside the workpieces. Consequently there are unique hazards to consider. Here are the major ones:

- Flying sparks can cause fire and explosion.
- Flying sparks and spatter can burn or injure eyes and skin.
- Electric shock from live electrical parts is a possible hazard.
- Hot metal and parts can cause burns.
- Moving electrode parts, such as tongs, tips, and linkages, can injure fingers and hands.
- Fumes from spot welding parts coated with cleaners, paints, or platings can be hazardous.

### HOW TO AVOID THE HAZARDS

- Wear safety goggles or a face shield. Wear long sleeved shirts. Do not weld near flammables – move them away. Keep a fire extinguisher nearby, and know how to use it.

- Wear dry insulating gloves. Install and ground unit according to electrical codes. Disconnect input power before servicing. Do not put hands between tips. Keep away from linkages and pinch points. Keep all guards and panels in place.
- Do not breathe the fumes. Use proper ventilation. Read Material Safety Data Sheets (MSDSs) for metals, coatings, and cleaners.
- Do not touch hot workpiece, tips, or tongs with bare hands. Allow tongs and tips to cool before touching. Wear proper insulating gloves when handling hot work or parts is necessary.

## INFORMATION SOURCES

Occupational Safety And Health Administration (OSHA). *Code of Federal Regulations*, Title 29 Labor, Parts 1901.1 to 1910.1450, available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 02402.

American National Standards Institute (ANSI). *Safety in Welding, Cutting, and Allied Processes* (ANSI Z49.1), published by the American Welding Society, 8669 Doral Blvd., Doral, Florida 33166; telephone 800-443-9353; web site: [www.aws.org](http://www.aws.org).

National Fire Protection Association (NFPA). *National Electric Code* (NFPA 70), available from National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02269-9101; telephone: 800-344-3555; Web site: [www.nfpa.org](http://www.nfpa.org).

Canadian Standards Association (CSA). *Safety in Welding, Cutting and Allied Processes* (Standard W117.2), available from Canadian Standards Association, Standards Sales, 5060 Spectrum Way, Suite 100, Mississauga, Ontario, Canada L4W 5N6; telephone 800-463-6727; web site: [www.csa.ca](http://www.csa.ca).

American National Standards Institute (ANSI). *Practice for Occupational and Educational Eye and Face Protection* (ANSI Z87.1), available from ANSI, 11 West 42nd Street, New York, NY 10036-8002; telephone: 212-642-4900; web site: [www.ansi.org](http://www.ansi.org).

National Fire Protection Association (NFPA). *Standard for Fire Prevention During Welding, Cutting and Other Hot Work* (NFPA 51B), available from National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02269-9101; telephone: 800-344-3555; Web site: [www.nfpa.org](http://www.nfpa.org).