



## RESISTANCE SPOT WELDING

### INTRODUCTION

Resistance Spot Welding is one of the oldest of the electric welding processes in use by industry today. The weld is made by a combination of heat, pressure, and time. As the name implies, it is the resistance of the material to be welded to current flow that causes a localized heating in the part. The pressure is exerted by the tongs and tips. The time is how long current flows in the joint, which is determined by the material thickness and type, amount of the current, and cross-sectional area of the welding tips and contact surfaces.

### PROCESS HAZARDS OVERVIEW

Resistance Spot Welding, unlike many other welding or cutting processes, produces little fumes and only negligible arc rays. Even the fire hazard from flying sparks is modest to low compared to other processes. However, because of the tongs and linkages, there is higher risk of mechanical hazards, such as pinching and crushing the fingers and hands, than other processes. Eye or face injury from flying metal and sparks is also present, since these particles are often thrown off from the weld.

### 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 flow causes localized heating in the joint, and the weld is made. The weld is unique because the actual weld nugget is formed internally with relation to the surface of the base metal. A MIG or TIG spot weld, on the other hand, starts at the surface

of one piece and goes through it and into the second piece to form the weld nugget. The MIG or TIG weld is made from one side only, while the resistance spot weld is normally made with electrodes on both sides of the workpieces.

### SAFETY HAZARDS

Resistance Spot Welding is not an open-arc process. Since the weld is made inside the workpieces, there are different and unique hazards to consider. Here are the major ones to be aware of and prepare for before actually making a weld.

- Flying sparks can cause fire and explosion.
- Flying sparks and hot metal are often thrown off from the weld joint and can burn or injure eyes and skin.
- Electric shock from wiring is a possible hazard.
- Hot metal and parts can cause burns.
- Moving parts, such as tongs, tips, and linkages, can injure fingers and hands.
- Fumes from spot welding on parts coated with cleaners, paints, and 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 all 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 if handling hot work or parts is necessary.

## INFORMATION SOURCES

Occupational Safety and Health Administration (OSHA). *Code of Federal Regulations*, Title 29 Labor, Chapter XVII, Parts 1900 to 1910, Order No. 869-019-00111-5, available from Superintendent of Documents, U.S. Government Printing Office, Washington DC 20402.

American National Standards Institute (ANSI). *Safety in Welding, Cutting, and Allied*

*Processes*, Z49.1, available from American Welding Society, 550 N.W. LeJeune Road, P.O. Box 351040, Miami, FL 33135.

National Fire Protection Association (ANSI/NFPA 70). *National Electrical Code*, available from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Canadian Standards Association (CSA) (Standard W117.2). *Code for Safety in Welding and Cutting*, available from Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

\_\_\_\_\_. *Safety Practices For Occupational and Educational Eye and Face Protection*, Z87.1, available from American National Standards Institute, 11 West 42nd Street, New York, NY 10036.

National Fire Protection Association. *Cutting and Welding Processes*, NFPA Standard 51B, available from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.