

**SPECIFICATIONS**  
**CADWELD® PLUS EXOTHERMIC**  
**WELDING CONNECTION SYSTEM**

1. SUMMARY

This specification covers the CADWELD PLUS exothermic welding system for use in making electrical connections. The CADWELD PLUS system supplied under this specification shall include weld metal, molds, electronic ignitors (Control Unit), tools and accessories as required.

2. SYSTEM APPLICATION

The CADWELD PLUS exothermic welding system is used for in making electrical connections of copper to copper, copper to steel or copper to cast iron or copper to brass/bronze for grounding and cathodic applications.

CADWELD connections shall be suitable for exposure to the elements of direct burial in earth or concrete without degradation over the lifetime of the grounding system.

3. REFERENCES

- a. ANSI/IEEE Std. 80 “IEEE Guide for Safety in AC Substation Grounding”
- b. IEEE Standard 837 IEEE “Standard for Qualifying Permanent Connections Used in Substation Grounding”
- c. NFPA 70 “National Electrical Code”
- d. ANSI / UL 467 “Grounding and Bonding Equipment”
- e. UL 506 “Specialty Transformers”
- f. EEC EN61000-6-2 “Electromagnetic Compatibility (EMC)”
- g. EEC EN55011 “Limits & Methods of Measurement of Radio Disturbance Characteristics of Industrial, Scientific & Medical (ISM) Radio Frequency Equipment”

4. SAFETY AGENCY APPROVALS

- a. CADWELD Exothermic Connection System

The exothermic welding system supplied under this specification must be Listed by Underwriters Laboratories to ANSI / UL 467 “Grounding and Bonding Equipment”.

- b. Electronic Ignitor (Control Unit)

The electronic ignitor must be approved the Ignition Transformer section of UL 506 “Specialty Transformers.”

## 5. INDEPENDENT TESTING

### a. CADWELD Exothermic Connection System

The CADWELD PLUS exothermic welding system furnished under this specification shall meet the applicable requirements of IEEE Std. 80 and IEEE Std. 837. Independent test data showing conformance to shall be readily available.

### b. Electronic Ignitor (Control Unit)

The electronic ignitor must meet applicable requirements for electromagnetic compatibility. An independent test report including results of radiated emission, electrostatic discharge and radiated immunity shall be readily available.

## 6. MATERIAL

### a. Molds

Molds shall be made from a synthetic graphite material capable of withstanding high temperatures that are capable of providing an average life of not less than fifty (50) separate exothermic welds.

### b. Weld Metal

Weld metal used for grounding connections shall contain copper oxide, aluminum and not less than 3% tin as the wetting agent.

Weld metal used for cathodic connections shall not contain tin, but shall contain vanadium.

## 7. ELECTRONIC IGNITOR

### a. Physical

The electronic ignitor case shall be constructed with a UL 94V0 rated PC/ABS alloy with a durable polycarbonate overlay to protect the LED and switch. The pushbutton shall be a membrane momentary switch with tactile feel. The LED indicator shall be a high intensity for viewing in sunlight

The leads shall be field replaceable, 18 AWG, 142-strand CU duplex, individually insulated with PVC and fiberglass braid with high temperature silicon outer jacket.

### b. Environmental

The operating temperature of the electronic ignitor shall be 0°F to 120°F (-17.8°C to 48.9°C) and the storage temperature shall be -40°F to 160°F (-40°C to 71.1°C).

The electronic ignitor shall be designed to survive a 3 feet drop to concrete and shall be water resistant due to submersion in 1" of water for 15 seconds.

c. Operating Characteristics

The unit shall be supplied with eight (8) AA alkaline cells and capable of delivering a minimum of 600 charge cycles on one set of batteries. The unit shall have reverse voltage protection and when stored for 5 years at room temperature with new batteries installed, shall retain at least 50% of the maximum number of shots.

The unit shall have a charge time of 5 seconds nominal, 7 seconds maximum on a new set of batteries. At end of battery life, the unit will have a charge time of 15 seconds maximum.

The unit shall be supplied with an over-voltage safety shutdown feature. If an over-voltage is detected, an internal circuit will latch and disable the pushbutton ON-switch, enabling internal self-discharge, and preventing further use. Removing and replacing the batteries will reset this latch circuit.

d. Pushbutton Operation

The pushbutton life shall be 100k cycles minimum. The unit will charge so long as user continues to hold pushbutton down, should user release pushbutton at any time before external discharge, unit will begin self discharge. Should user again press pushbutton, unit will resume charging, so long as unit is not at full charge.

Upon reaching charge voltage, unit will dwell for 1 second +/-10%, so long as user continues to hold pushbutton down continuously.

At the end of the dwell time, so long as user continues to hold pushbutton down continuously, unit will trigger an internal self-discharge.

Following an external discharge, user must release the pushbutton for at least 1 second before the unit will begin another charge cycle.

8. IDENTIFICATION

a. Molds

Graphite molds shall bear permanent marking indicating the name of the manufacturer, the mold part number, the type and size of welding mixture compatible with the welding process and the size of the cable or bus connection. Instructions detailing general safety information, connection preparation and welding procedures shall be provided with each mold.

b. Weld Metal

Weld metal packages shall be color coded for easy identification and the weld metal manufacturing lot number shall be laser printed with permanent ink.

Integral weld metal packages shall be identified as to the part number (size), and type of metals to be connected or shall be marked for their intended use – such as cathodic connections.

## 9. MANUFACTURER'S QUALIFICATIONS

- a. Manufacturer shall be ISO9001:2000 certified.
- b. Manufacturer shall have been engaged in the design and manufacturing of exothermic systems for at least ten (20) years.

## 10. QUALITY CONTROL

- a. Weld Metal

Weld metal shall be controlled at the factory and subjected to routing and rigid quality control inspection procedures.

- b. Electronic Ignitor (Control Unit)

The electronic ignitor shall be marked with traceable manufacturing run number on the unit and on the external packaging for quality control purposes.

## 11. PACKAGING AND SHIPPING

Weld metal shall be pre-measured, packaged and sealed in tamper-proof containers to prevent spillage during shipping. Integral weld metal cups shall be packaged in be moisture resistant, recyclable containers.

## 12. TRAINING

Use of the CADWELD PLUS exothermic connection system shall require minimal training. Factory trained personnel shall respond to field calls quickly and provide training for construction crews on the proper techniques for making CADWELD connections.