



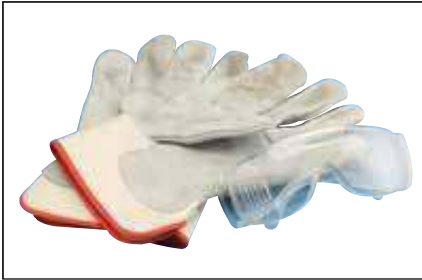
**CONNECT AND PROTECT**

# nVent ERICO Cadweld Installation and Inspection Guide

  
nVent

**ERICO**

## nVent ERICO Cadweld One Shot



**Fig. 1**  
Always wear protective safety glasses and gloves while working with Cadweld exothermic products.



**Fig. 2**  
Gather the proper materials and equipment for the type of connection you are making. The Cadweld One Shot system requires a Cadweld One Shot ceramic mold, welding material, wire brush for cleaning/preparing conductors, flint igniter, and propane torch.

**NOTE: Additional materials may be required for your specific application. Refer to your mold instructions. Advise nearby personnel of welding operations in the area prior to ignition.**



**Fig. 3**  
Check to ensure the ceramic mold is not broken, which could cause leakage of molten weld metal during the reaction.

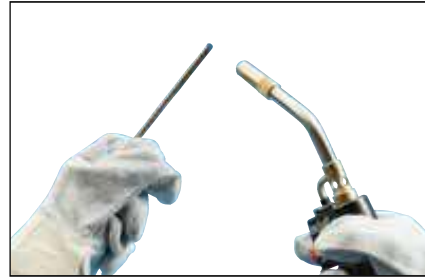
Inspect the Cadweld One Shot box label to ensure that it corresponds to the application, indicated by the:

1. Cadweld One Shot part number
2. conductor size
3. welding material required
4. other materials required

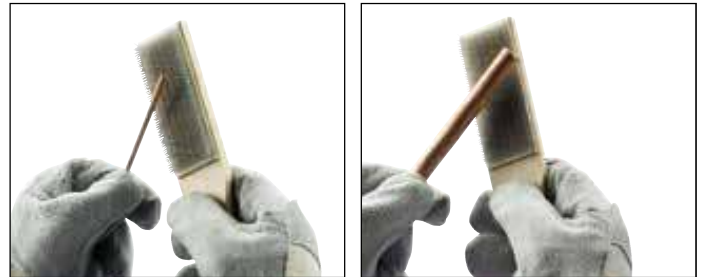
The mold must be correct for the conductor size and application.

**DO NOT MODIFY MOLDS.**

## nVent ERICO Cadweld One Shot



**Fig. 4**  
The conductors should be clean and dry before the connection is made. Use a propane torch to dry wire conductors and remove remaining cleaning residue, solvent, or water before making the Cadweld One Shot connection.



**Fig. 5**  
Next, use a wire brush to further prepare the surface of the conductors and ground rod (Cadweld T-313 or T-314 brush). Scrape the outer surface to remove dirt and oxidation. You will notice a slight color change.



**Fig. 6**  
Each Cadweld One Shot contains a rubber grommet at the bottom of the mold. Gently turn the Cadweld One Shot onto the ground rod until the ground rod reaches the stopper and cannot go any further.

## nVent ERICO Cadweld One Shot



**Fig. 7**  
Insert the conductors and position them for the connection.



**Fig. 8**  
Place the steel disk into the Cadweld One Shot with the concave side facing up.



**Fig. 9**  
Ensure that the steel disk is properly seated inside the Cadweld One Shot.



**Fig. 10**  
Next, take the tube of welding material included in the Cadweld One Shot package and remove the lid over the crucible.

## nVent ERICO Cadweld One Shot



**Fig. 11**  
Pour the loose welding material powder into the Cadweld One Shot mold.



**Fig. 12**  
Place the cover on the top of the Cadweld One Shot.



**Fig. 13**  
The bottom of the tube contains compressed material (starting material). Tap the bottom of the tube a couple of times to loosen this material.



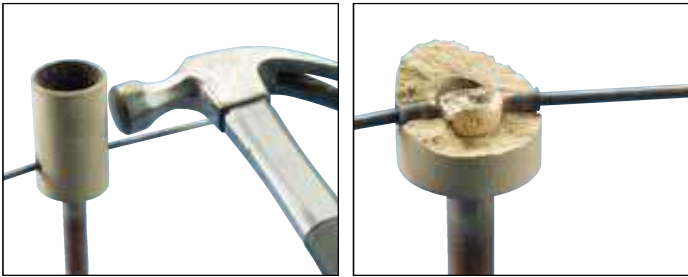
**Fig. 14**  
Pour the starting material onto the Cadweld One Shot cover.

**NOTE: Welding material is an exothermic mixture and reacts to produce hot molten material with temperatures in excess of 2500 degrees Fahrenheit (1400 degrees Celsius) and a localized release of smoke. Avoid direct eye contact with "flash" of light from ignition of starting material. Avoid inhalation of smoke/fumes.**

## nVent ERICO Cadweld One Shot



**Fig. 15**  
Aiming the flint igniter from the side, ignite the starting material on the mold cover. Withdraw the igniter quickly to prevent fouling. Allow approximately 30 seconds for completion of the reaction and solidification of the molten material.



**Fig. 16**  
Break the ceramic Cadweld One Shot mold off of the connection. Avoid contact with hot materials. See the "nVent ERICO Cadweld Quality Standards" section to see whether a quality connection has been made.



**Fig. 17**  
You are ready to make another Cadweld One Shot connection.

## nVent ERICO Cadweld Quality Standards

All Cadweld materials are produced to high standards under stringent quality control. All Cadweld connections are designed and tested using Cadweld molds, welding materials, and accessories.

In the absence of any standards, national or international, we cannot accurately predict the individual product standards of our competition, either known or unknown. Therefore, mixing of one manufacturer's molds with another manufacturer's welding materials can predictably lead to finished welds that do not meet the standards of either manufacturer. After all, one of the advantages of exothermic welding as a welding process is the fact that it is pre-engineered.

### Specifications for Cadweld Connections

All grounding system connections shall be made by the Cadweld process. Connections shall include, but not be limited to, all cable to cable splices, T's, X's, etc.; all cable to ground rods, ground rod splices, cable to steel and cast iron; and cable lug terminations.

Procedures listed in all Cadweld instructions shall be followed. Molds shall not be altered in the field.

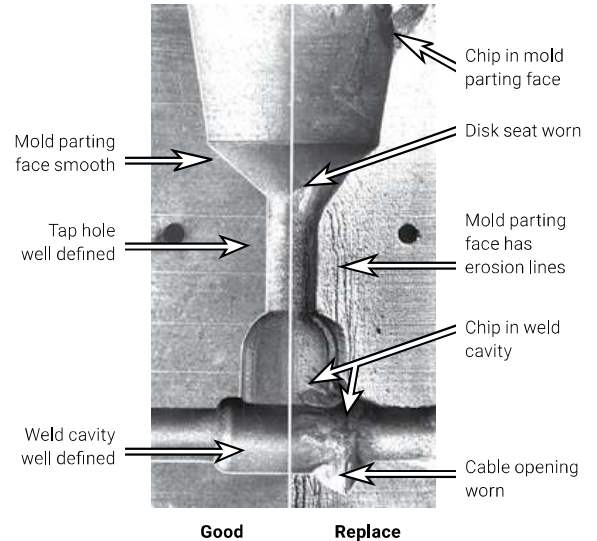
All materials used (molds, welding material, tools, accessories, etc.) shall be Cadweld materials, manufactured by nVent ERICO. Materials of different manufacturers shall not be mixed.

A Cadweld mold is designed to last for an average of 50 connections. This will vary according to the care given the mold during use.

**Inspect the mold regularly. Check the following items to determine if a mold should be replaced:**

## nVent ERICO Cadweld Quality Standards

### CADWELD MOLD INSPECTION



### Cable Opening

- The conductor should fit snugly. A loose fit will cause leakage.
- The opening should not be chipped or worn.

### Weld Cavity

- The cavity should be well defined.
- There should be no chips or gouges.

### Tap Hole

- The tap hole should be well defined.

### Disk Seat

- The seat should not be worn or chipped; the disk must seat properly.

### Mold Parting Face

- The parting face should not be chipped.
- The parting face should always be cleaned properly. Use a clean shop towel or newspaper and wipe clean. Using a wire brush to clean the mold will cause erosion and quickly destroy the mold.

**INSPECTION OF CADWELD CONNECTIONS  
GENERAL INDICATORS**

Proper inspection of a Cadweld connection relies on the judgment of the field personnel. Look closely at the size, color, surface finish, and porosity of the connection.

Following the guidelines below will assist in making meaningful inspections. Photographs of good, acceptable, and reject connections appear on pages 44-47.

**SIZE**

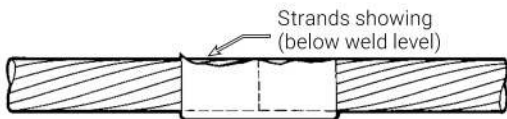
1. No portion of the conductor within the confines of the weld should be exposed.
2. Maximum depression under the riser on horizontal connections (after the slag has been removed) should be no lower than the top of the conductor.

A low fill indicates:

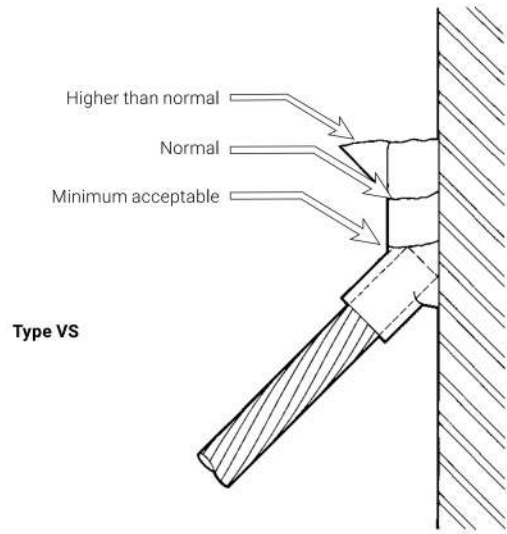
- (a) Not enough welding material was used
- (b) Excessive leakage of molten metal
- (c) Improper positioning of the conductor inside the mold
- (d) Movement of conductor

3. Excessively high fill (tall riser) indicates:

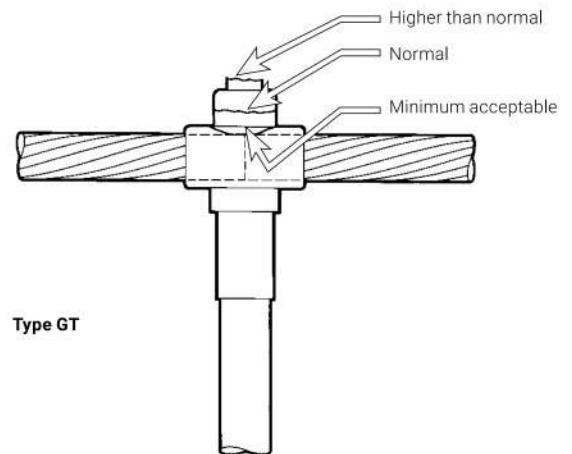
- (a) Too large welding material size was used (connection is still acceptable)
- (b) Apparent volume increase due to contaminants in conductor or mold (see "Porosity" on page 42)



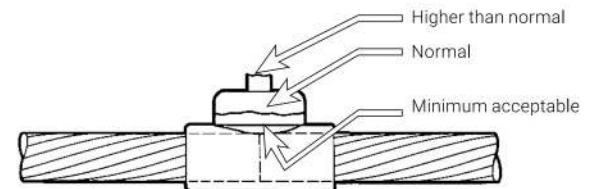
**Unacceptable**



**Type VS**



**Type GT**



**Type SS**

### INSPECTION OF CADWELD CONNECTIONS GENERAL INDICATORS (CONTINUED)

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#### Color

The color of a Cadweld connection is best seen after a light wire brushing of the connection. It should normally be gold to bronze in color. Occasionally, it may be silvery at the top. This silver color indicates "tin sweat" of the surface, a normal condition.

A Cadweld connection to cast iron or galvanized surfaces is often silvery due to alloying with the metals.

#### Surface Finish

The surface of a Cadweld connection should be reasonably smooth and free of major slag deposits. If slag deposits cover more than 20% of the connection surface, or if any cable strands are exposed after slag has been removed, the connection must be rejected.

#### Porosity

The connection should be essentially free from porosity. Excessive porosity is normally the result of contaminants (water, oil, dirt, etc.) in the conductor and/or mold. A few small pinholes may be present on the surface of the riser. The depth of a pinhole must never extend beyond the center of the conductor. To check the depth, probe the pinhole with a 1/32-in.-diameter wire (paper clip). Reject the connection if the depth of the pinhole extends beyond the center of the conductor.

### INSPECTION OF CADWELD CONNECTIONS VISUAL INSPECTION

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#### Photographic Guides

Like all electrical connections, a visual inspection is no guarantee of performance. Crimped or bolted connections cannot be inspected visually, but Cadweld connections can be visually inspected and provide an indication of the quality of the weld. Visual inspection is recommended as a practical minimum.

Use the photographs on the following pages as a guide to visual inspection. Cadweld connections are normally rated as good, acceptable or reject.

A **good** connection is a normal weld with only minor surface imperfections.

An **acceptable** connection is a less than normal weld, but a good performing weld. Imperfections indicate that 1) a new mold is required, 2) a change in procedure is necessary, or 3) the proper mold conductor and/or welding material should be used.

A **reject** connection shows inadequate fill or an extra high riser due to 1) use of incorrect procedure, 2) use of incorrect equipment and/or equipment worn beyond its useful life, or 3) use of incorrect material.

**INSPECTION OF  
CADWELD CONNECTIONS  
PHOTOGRAPHIC GUIDES**

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**Good.**  
A solid weld with only minor surface imperfections.

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**Acceptable.**  
Fill is lower than normal, but still sufficient.

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**Reject.**  
A worn or incorrect mold was used, allowing leakage around conductor. The fill in this connection is insufficient to allow it as acceptable. Replacement of mold is required prior to making next connection.



**Acceptable.**  
The presence of water/moisture in conductor strands or mold indicates that one or both were not properly dried. Although the riser is porous, the weld is solid. The degree of porosity is not sufficient to reject this connection.

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**Reject.**  
Extreme amounts of slag on surface are caused by welding material leaking past disk or complete lack of disk. Inspect the condition of mold disk seat and check disk positioning prior to making the next connection.

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**Reject.**  
Excessive water in cable strands and/or mold.



**INSPECTION OF  
CADWELD CONNECTIONS  
PHOTOGRAPHIC GUIDES (CONTINUED)**

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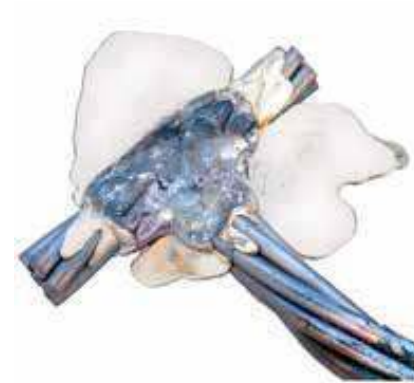


**Reject.**  
Light carbon traces on cable and connection are evidence of oil on cable strands. Oily cables must be cleaned with safety solvent.

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**Reject.**  
Heavy carbon coating on cable and connection is evidence of large amounts of oil or grease on cable. Cable must be cleaned with safety solvent.



**Reject.**  
Fill too low. Weld cavity was not filled over cable strands. "Fins" indicate that the mold was not closed tightly due to incorrect mold, incorrectly adjusted handle clamp, or presence of foreign material in mold parting line. Before making the next connection, check the mold for each of the above.

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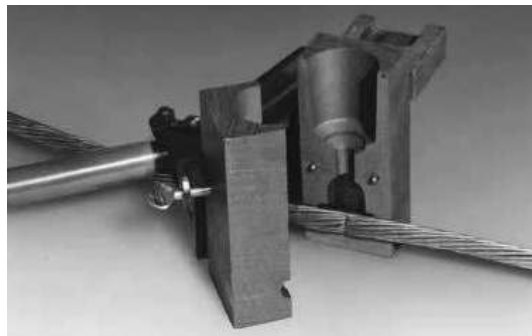


**Reject.**  
Fill too low. Weld cavity was not filled over cable strands. Absence of leakage indicates that welding material size was incorrect (too small) or thru conductor moved.

### FIELD SITUATION GUIDE

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Most field difficulties can be overcome by checking the following problems.



### PROBLEM A

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#### The mold doesn't close tightly.

Check for:

1. Adjustment of handle clamps
2. Cables out of round or bent
3. Dirt or slag in mold parting line
4. Correct cable size

NOTE: Use "C" clamp if necessary

### PROBLEM B

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#### The connection is covered with excessive slag.

Check for:

1. Welding material leaking past the disk, caused by:
  - (a) Chipped graphite at tap hole
  - (b) Disk moved when welding material was dumped
  - (c) Disk not properly seated
  - (d) Disk was not installed

NOTE: A small amount of slag on the surface is not abnormal

### PROBLEM C

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#### Molten metal "spits" out of the crucible when making a connection.

Remedy:

1. See Problem D.

### PROBLEM D

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#### The connection is porous

Check for:

1. Presence of moisture either in conductor or mold.

Remedy:

- (a) Dry the conductor by wiping and heating
- (b) Heat mold with torch (to above 212°F) or by igniting welding material in mold without any conductors, taking care to prevent burns from the hot material running out of the mold

NOTE: Do not use the second method of heating if the mold has wear plates

Check for:

2. Other contaminants (oil, insulation, etc.) present in conductors.

Remedy:

- (a) Use a safety solvent to wash the conductor, then dry it
- (b) If insulation is present between strands, remove it

Check for:

3. Mold packing material in weld cavity of mold.

Remedy:

- (a) Always apply mold packing material to conductor after mold is closed

### PROBLEM E

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#### The conductors do not weld

Check for:

1. Conductors were not properly cleaned and dried.

Remedy:

- (a) Remove oxides with a wire brush. If heavily oxidized, have fresh-cut conductor end and use Cadweld Heavy Duty molds
- (b) Dry conductors with a torch

Check for:

2. Conductors not properly positioned in the mold.

Remedy:

- (a) Check for proper gap or butting as required (see the mold tag and read the instructions packaged with mold)

## nVent ERICO Cadweld Quality Standards

### Field Situation Guide (continued)

(b) Check to be sure gap is centered under tap hole

NOTE: In some cases, the run (thru) conductor must be cut and gapped. Follow instructions for same or use Cadweld Heavy Duty molds.

### PROBLEM F

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#### The welding material leaks around the conductor.

Remedy:

1. Use packing material around the conductor after the mold is closed.
2. Use molds with wear plates (which also act as chill plates).
3. Check for the proper mold. Mold must be sized for the cable being welded.
4. If the mold is excessively worn, replace with a new mold.

### PROBLEM G

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#### The connection has “fins”— metal is lost.

Check for:

1. Mold not completely closed.
2. Mold worn beyond useful life and needs replacement.

### PROBLEM H

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#### The cables pull out of the mold during welding.

Remedy:

1. Use a clamp (Cadweld B-265) or other means to prevent movement of conductors when welding.

### PROBLEM I

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#### Insufficient fill material to cover conductors

Check for:

1. Use of proper welding material size (see mold tag).
2. Too large a gap between conductors (see positioning instructions).
3. Mold leakage.

## nVent ERICO Cadweld Quality Standards

Remedy:

- (a) See Problem F
  - (b) See Problem G
  - (c) See Problem H
4. Conductor movement.

### PROBLEM J

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#### The riser is too high.

Check for:

1. Use of proper welding material size (see mold tag).
2. Moisture in mold or conductor.

Remedy:

- (a) See Problem D

### PROBLEM K

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#### The mold wears out quickly.

(Molds should produce an average of 50 connections.)

Remedy:

1. Use Cadweld B-265 cable clamp for hard-drawn copper or DSA Copperweld®.
2. Clean the mold with a soft brush, clean cloth, or newspaper. DO NOT USE A WIRE BRUSH.
3. Use care in removing the mold from a finished connection to prevent chipping of mold.

### PROBLEM L

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#### When welding to steel, the weld does not “stick” to the steel.

Remedy:

1. Clean the steel with a rasp or grinder to bright metal. When grinding, use an nVent ERICO approved grinding wheel only. All mill scale, paint, and/or other coating must be removed. Wire brushing will NOT suffice. Grease must be removed with safety solvent before cleaning.
2. Clean galvanized surfaces with a wire brush or emery cloth. However, extra heavy galvanized steel must be cleaned with a rasp.
3. If the steel is moist, heat with a torch (from the back side if possible). Any carbon deposit from the flame must be removed.
4. If conductors are not in proper position, check the instruction sheet.

## nVent ERICO Cadweld Quality Standards

### Field Situation Guide (continued)

#### **PROBLEM M**

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**When welding to ductile iron or cast iron, the weld does not “stick” to the surface.**

Remedy:

1. Remove all coatings before cleaning.
2. Clean the surface with a rasp or grinder to bright metal.  
When grinding, use an nVent ERICO-approved wheel only.
3. Clean the surface with a safety solvent after grinding or rasping.
4. Use Cadweld XF-19 alloy welding material (orange cap).

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