Cold Silver Solder Test Lead and Current Conductor

(Patent No. 11,231,303)

"No Heat" Method of Wire Attachment

Technical Data Sheet

Description

Method of attaching wires to a buried or above ground metal pipeline or underground storage tank (UST) without using typical methods that generate high heat during wire attachment. The NotHot™ is a "cold silver solder" that makes a strong, permanent, low resistance wire connection. NotHot™ is an alternative to exothermic welding or brazing when those methods are unsafe or undesirable.

Each kit includes components to install two test leads or one current conductor. Test leads include 20-feet of lead wire pre-attached to a metal saddle. The Current conductor does not include cable; the cable is attached by crimping in the field. Conductive epoxy is then field-mixed and applied to the saddle which is placed on the prepared pipeline. A magnet, embedded within the saddle holds the assembly in place while the epoxy cures. For test lead installations through narrow excavated holes, or potholes, a "Keyhole" tool is available. Keyhole installations can save considerable time and money.

Applications and Usages

NotHot™ test leads can be used for termination of sacrificial anodes or coupons, or as a connection for pipe location. NotHot™ current conductors can be used as rectifier negative or bond cable connections.

The NotHot™ is ideal for usage when there is a safety concern such as:

- Risk of ignition/combustion in the environment
- Thin wall or de-rated pipelines

- Whenever it is unknown if a plastic pipe has been inserted through a service line.
- Or whenever Hot Work is best avoided.

Manufacturer Information

Part Numbers (PN)

Test Lead Kit (2ea. test leads)-	PN: 2KT10
Current Conductor (#6 wire)-	PN: 1KC106
Current Conductor (#4 wire)-	PN: 1KC104
Keyhole Applicator Tool (for test leads)	PN: TC10

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Features

- Saddle is constructed of a machined, forged carbon steel.
- Saddle design allows for parallel alignment with curved surfaces.
- Applies to all pipe diameters from 1/2” to flat surfaces.
- Abrasive blasted finish creates a uniform anchor pattern.
- Machined cleats allow for more surface area and a stronger bond.
- Silver soldered copper sleeved reinforced connection sealed with adhesive lined heat shrink.
- Inset Neodymium N52 nickel-plated rare-earth magnet holds the saddle in place while the conductive epoxy cures.
- The conductive epoxy (cold silver solder) provides a strong permanent electrical bond.
- Test leads come with pre-attached 20-feet of 12awg solid copper HMWPE insulated wire for direct burial application.
- Current conductor models do not include wire.

Technical Data

Saddle	• Machined forged carbon steel • Test leads 2.125L x 0.73W x 0.25H • Current conductor 4.25L x 0.75W x 0.25H
Magnet	• **Material:** Sintered neodymium magnet, grade N52 NdFeB rare earth magnet • **Remanence (Br):** Test leads:14,400 Gauss or 1.44 Tesla
Attached Connection type	• Silver bearing lead-free solder Sn - 94% Ag - 6%. • 0.118" Copper Reinforced Sleeve • Test leads 20-feet of 12AWG Solid Copper HMWPE insulated wire, pre-attached. • Current Conductor- Does not include wire. Saddle has #6 or #4awg barrel for field crimped connection.
Connection Resistance (approximate without wire)	Test Lead ≤ 2.5 mΩ Current Conductor ≤ 0.5 mΩ
DC Current Conductor Rating (recommended NTE).	#6: 60 Amps #4: 80 Amps
AC Fault Current (for DC Decoupler Termination)	Use two #4 Current Conductors in Parallel for 5000A rating
Conductive Epoxy	Shelf Life- 3-Years Refer to MG Chemicals 8331D TDS
Application Temperature Range	Recommended 50 °F or greater
Service Temperature Range	-67 °F to 302 °F

Application Instructions

Follow the procedure below for best results. Refer to MG Chemicals TDS for use of the conductive epoxy.

Safety/Materials and Tools: Items to complete this procedure:

Included

- Quick reference instructions inside of package lid.
- Material included in Test Leads kit and Current Conductor kit:
  - 2ea. metal saddles with 20-feet of wire each, 1ea. conductive 2-part epoxy kit (use ½ amount per test lead), epoxy mixing cups and stir sticks, nitrile gloves, and isopropyl alcohol pad wipes.
- Material included in Current Conductor kit:
  - 1ea. metal saddle with barrel (#6 or #4 as ordered) to accept cable. 1ea. conductive 2-part epoxy kit, mixing cup, stir stick, nitrile gloves, and isopropyl alcohol wipe.

Not Included

- Standard PPE including safety glasses.
- Pliers. To remove end caps from epoxy syringes.
- Crimpers (for current conductor only). Ensure properly sized crimper is available for a #6 or #4 connection as applicable.
- Clean up rags.
- Coating repair patch material.

Procedure Steps:

1. Prepare Pipe. Expose the pipe and remove the pipe coating from an area slightly larger than the NotHot™ saddle that is being applied. Scour the pipe surface until a clean metal finish with a good anchor pattern (rough) is obtained using an operator approved method. Wipe the pipe surface with an alcohol wipe to remove any oils or contaminants.

Note: For keyhole installations, it is recommended to insert a cardboard Sonotube downhole prior to cleaning the pipe to keep debris from falling in during the installation process.

2. Prepare NotHot™ Saddles.
    a. For test lead installation, remove the NotHot™ saddles from the box and protective packaging and uncoil the lead wire(s). See figure 1 for NotHot™ components. Wrap a coil of wire around the pipeline or use tape, for strain relief.
    b. For current conductor installation, remove from packaging and crimp (crimp the barrel in 3 evenly spaced locations) the desired length of negative or bond cable to the NotHot™. Wrap a coil of cable around the pipeline or use tape, for strain relief.
    c. Use the alcohol pad to clean the cleated surface of the pipe and mating side of the saddle.

3. Mix the two-part epoxy
    a. Wear the provided nitrile gloves or Company approved gloves while mixing and applying the epoxy.
    b. For test leads- Twist off end caps (may require pliers) and apply 1.5ml (half) from the part A syringe and 1.5ml (half) from the part B syringe (see figure 2) into the mixing cup. Thoroughly stir with the provided stir stick. If applying two test leads at the same time, the full amount of epoxy may be mixed at once for both saddles but note there is a 10-minute working time to apply the epoxy.

    Note: If not installing two leads at once, be sure to replace caps to ends of the syringes, for use later.

    c. For the current conductor, mix the full 3.0ml amount of both part A and part B.

4. Apply the epoxy to the saddle.

a. Using the stir stick, apply the epoxy in the cup to the cleated mating surface of the NotHot™ saddle(s). See figure 3.
b. For test leads, half of epoxy kit is applied to each saddle.
c. For the current conductor, the full epoxy kit is applied to the saddle.

5. Attach the NotHot™ saddle to the cleaned pipe.
    a. Carefully align the saddle to the prepared surface and lower it. Note that when it is close to the pipe the magnet will grab it, so do this slowly and carefully. (See figure 4).
    b. Use the stir stick to smooth the epoxy out around the saddle and fill any gaps around the edges.
    c. If using the NotHot™ Keyhole Applicator tool, engage the tool magnet to the top of the saddle by rotating the handle clockwise to the "ON" position. See figure 5. Using the long handle, lower the saddle to the pipe making sure it is properly aligned and seated to the curvature of the pipe and then disengage the applicator tool by rotating it counterclockwise to the "OFF" position. See figure 6. The handle is 5-feet long and extendable up to 9-feet using button on the pole.

6. Set-up time
    a. Allow the epoxy to set-up
        i. Coating can be applied as soon as the epoxy is set-up. This typically takes between 15min to 1 hour in most cases. Heat can be applied to accelerate this process as described below.
        ii. The epoxy is set-up when it is no longer soft and tacky. This can be tested by checking the epoxy at the edges of the installed saddle, or inside the used mixing cup.
        iii. During colder weather (<50°F), set-up time can be accelerated using a heat blower.

7. Patching (Coating Repair)

a. The connection can be patched as soon as the epoxy is set-up. the epoxy will continue to cure to a full-cure underneath the coating patch.
b. Use an approved Company coating procedure to patch the connections. Patch the connection in the same manner as a exothermic weld or pin braze connection.

Reference Photographs:

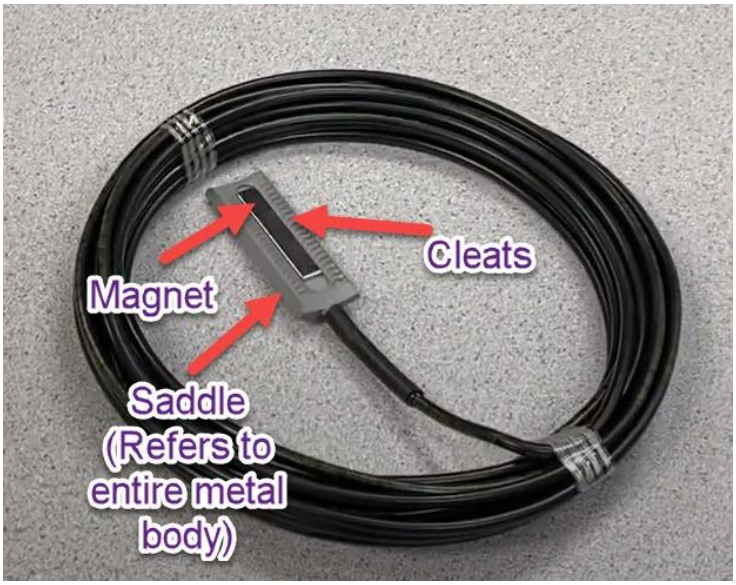

Figure 1- NotHot™ Components

Figure 2- - Two-part Epoxy Syringes

Figure 3- Applied Adhesive Epoxy

Figure 4- Completed Installation

Figure 5- Saddle set into the Keyhole Tool

Figure 6- Applying Saddle on the Pipe