



Parker Hannifin Corporation  
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Technical Guide

# Guide for Static Electricity Grounding of Industrial Hose Assemblies

## Hoses with Helical Wire(s) or Static Wire(s)



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Parker recommends using only Parker-qualified hose, crimp couplings, crimping equipment and specifications to fabricate industrial hose assemblies. For validated specifications, use Parker's CrimpSource® tool at [parker.com/crimpsource](http://parker.com/crimpsource).

Movement of some media—whether particulates or liquids—through a hose may cause hazardous buildup of static electricity. Uncontrolled static electricity buildup may lead to shock and/or the discharge of a spark, which could cause ignition of combustible materials causing property damage, injury or death.

Because hose assemblies might be used in applications for which they were not fabricated, Parker suggests grounding all hose assemblies that contain grounding elements. Hose components such as helical wires and static wires may be used to safely conduct a static charge to ground. Care should be taken to properly prepare, fabricate and test industrial hose assemblies for electrical conductivity.

There are no universal electrical conductivity/resistivity standards that apply to industrial hose assemblies, applications and service. Parker suggests using the following guideline, which may be superseded by governmental, industry and/or customer requirements, regulations, specifications or standards.

 **WARNING! – USER RESPONSIBILITY**

**Failure or improper selection or improper use of the products or guidelines described herein or related items can cause death, personal injury and property damage.**

There are numerous Cautionary Notations within this document and the User is directed to them. Refer to additional Safety information published in *Parker Catalog 4800* and in the *Parker Safety Guide 4400-B.1*.

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### 1. Determine and Inspect Appropriate Hose Assembly Components

- a. Consult the customer/end user to obtain S.T.A.M.P.E.D. and all other data for the requirements of the application.
- b. Select the most appropriate assembly components.
- a. Inspect all assembly components for correct identity and size, appearance, cleanliness and quality.
  - **CAUTION:** Do not use any component that displays any signs of nonconformance.

### 2. Determine Hose Assembly Length

- a. Determine the required overall length of the hose assembly for the application.
- b. Plan to install the hose assembly without kinking or severe bends (especially at the coupling interfaces) with enough slack to allow for contraction under pressurization and to comfortably attach the hose to connections without stretching, twisting or otherwise stressing the assembly at or between attachment points.
- c. Allow for any other application-specific conditions that may apply.

### 3. Determine Hose Length

- a. The length of hose will be shorter than the hose assembly.
- b. Determine the length of hose by calculating the overall assembly length, minus the length that each coupling will be inserted into each end of hose.
  - **FORMULA:**  $\text{Cut Hose Length} = [(\text{Overall Hose Assembly Length}) - (C1 + C2)]$   
C1 = Coupling length minus insertion depth of 1st coupling  
C2 = Coupling length minus insertion depth of 2nd coupling

### 4. Cut Hose

- a. Cut hose straight/perpendicular to its axis.
- b. For hose that incorporates a helical wire or a static wire element, use a hacksaw or power driven bladed cutting tool.
  - **CAUTION:** Ends of cut wire may be sharp.
- c. Clean the inside diameter of the hose after cutting.
- d. Place the hose on a clean, dry, nonconductive surface.
- e. Test the cut length for electrical conductivity (see steps below).
  - i. This will ensure that the length of hose is a qualified component from which to fabricate a conductive hose assembly.
  - ii. The finished/fabricated hose assembly also requires conductivity testing.

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### 5. Fabricate Hose Assembly & Make Electrically (Static) Conductive

- a. Using pliers or other appropriate tool, manually extract **all** wires from the body of the hose to a length of approximately 1/2 inch.
  - i. Some hoses contain more than one helical wire or more than one static wire.
    - **CAUTION:** *To avoid grounding ends of different wires, all wires from the body of the hose must be grounded.*
  - ii. For thick wall hose, extracting more than 1/2 inch of wire may be required.
    - *Ensure that the length of wire does not exceed the length of the coupling shank.*
- b. Bend each end of wire around the wall of the hose, positioning against the inner tube of the hose. This will prepare the hose assembly for direct contact between the metal wire/metal coupling shank.
  - i. For maximum contact with the inserted shank, keep the wire parallel to the axis of the hose.
    - **CAUTION:** *Do not puncture the inner tube of the hose.*
    - **CAUTION:** *Excessive length of wire may exceed the length of the coupling shank, creating a leak path upon insertion/attachment of the shank.*
- c. Ensure that each end of wire is securely in place and does not back out of the inside diameter of the hose before and/or during the coupling installation process.
- d. Apply this procedure to each end of the hose.

### 6. Coupling Attachment

- a. For Parker hose, consult CrimpSource® for crimp specifications, including crimp coupling designation.
  - i. Line up the shoulder of the ferrule at the designated position relative to the end of the hose.
  - ii. Using a grease pencil or similar marking device, mark the cover of the hose where the ferrule terminates.
- b. Using a vise or similar device, secure the hose in place to prevent movement and possible damage to the inner tube of the hose during coupling insertion, and to ensure proper coupling alignment.
  - **CAUTION:** *Do not damage the hose in the process of securing it.*

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- c. If necessary to aid the insertion process, lubricate with soapy water the inner tube of the hose and the shank of the coupling.
  - **CAUTION:** *Do not cut or skive the inner tube of the hose, or file the shank of the coupling, or alter either hose assembly component in any way.*
  - *Do not use other lubrication agents without first consulting the hose and coupling manufacturer.*
  - *Inspect the connection to ensure there was no coupling slippage or misalignment compared to the mark on the cover of the hose.*
- d. Apply this procedure to each end of the hose.
- e. Follow the CrimpSource crimp specification, and crimp procedure shown in the Parker crimper operator's manual.

### 7. Electrical Conductivity Measurement Procedure

- a. Place the hose on a clean, dry, nonconductive surface.
- b. It is essential that contact resistance be minimized between the end fittings and the testing instrument (ohmmeter).
- c. Directly attach the metal leads of the ohmmeter at each termination of each coupling.
- d. Apply the test voltage (9V) and measure the resistance for 5 seconds  $\pm$ 1 second after the voltage is applied.

### 8. Electrical Conductivity Rating Criteria

- a. An application may be subject to specific conductivity requirements which take precedence:
  - those established by federal, state or local government laws, regulations or statutes, and/or
  - those established by industry standards organizations, and/or
  - those established by customers/end users
- b. For applications not covered by the above, Parker suggests using the following measurement criteria to qualify hose assemblies:  
**< 10 ohms resistance**
- c. Record and safely store customer/testing data.

### 9. Install Hose Assembly in Application

- a. Ensure each coupling of the hose assembly maintains secure metal-to-metal contact with a grounded fixture.

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### User Responsibility

*Due to the wide variety of operating conditions and applications for Hose and Fittings, Parker does not represent or warrant that any particular Hose or Fitting is suitable for any specific end use system. This document does not analyze all technical parameters that must be considered in selecting components, or fabricating and testing a hose assembly. The user, through its own analysis and testing, is solely responsible for:*

- *Making the final selection of the products.*
- *Assuring that the user's requirements are met and that the application presents no health or safety hazards.*
- *Providing all appropriate health and safety warnings on the equipment on which the Products are used.*
- *Assuring compliance with all applicable government and industry standards.*

### Further Information

Association of Rubber Products Manufacturers (ARPM)

- *Hose Handbook IP-2*
- [www.arpminc.com](http://www.arpminc.com)

International Standards Organization (ISO)

- *Standard 8031:2009*
- [www.iso.org](http://www.iso.org)

National Association of Hose and Accessories Distribution (NAHAD)

[www.nahad.org](http://www.nahad.org)

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Hose Products Division

- *Industrial Hose Catalog 4800*
- *Parker Safety Guide 4400-B.1*

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If there are any questions please contact  
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