

# Technical information

## Recommended installation procedures

PVC-coated conduit is installed in much the same manner as conventional rigid galvanized steel conduit; however, certain precautions must be taken to protect the exterior coating and ensure satisfactory results. By following these guidelines and using the proper tooling, a damage-free installation can be achieved.

When an engineer has specified Ocal PVC-coated conduit, the intent is for the total run to be PVC coated. There are no exceptions to this rule. This means from the beginning of the run to its completion and all in between, no exposed metal shall be allowed.

### Clamping in a yoke-style vise



Ocal jaw vise adapters  
JAWS23  
See page F60



The first step is the correct clamping of the PVC-coated conduit.

When you use a yoke-style vise, you should replace both the upper and lower jaw inserts with the specially designed Ocal jaw vise adapters. These adapters provide greater clamping force and prevent the pipe from spinning during the threading process. (See Catalog No. JAWS23 on page F60).

### Clamping in a chain-style vise



Chain-style vise  
Ridgid Tools 460-6  
See page F59

If a chain-style vise is used, the chain – as well as the jaw inserts – will tear the PVC coating when the threading force is applied.

To prevent this from happening, installers sometimes make “shells” from PVC pipe or standard rigid steel conduit that fit over the PVC-coated conduit. To save time and obtain more consistency, longer life and better protection, you can use the Ocal half-shell clamps.

Available in trade sizes ½" to 6", Ocal half-shell clamps are made from ductile iron for superior strength and durability. They feature a cross-hatched interior surface designed to safeguard the PVC coating while holding the conduit securely in a chain-style vise.

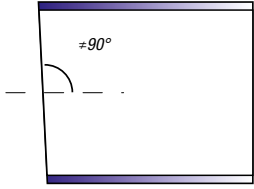
Half-Shell Clamp Sets  
HLF-SHL-CLP-SET1



Half-Shell Clamps  
for conduit sizes ½" to 6"  
HLF-SHL-CLP-

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Cutting with a band saw cutter



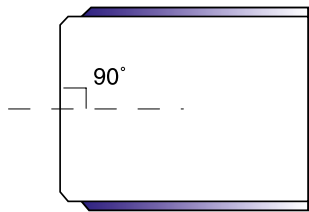
A band saw cutter will cut the PVC coating flush with the end of the conduit. PVC material cut flush to the end of the conduit will not allow the die teeth to bite into the steel to start the threading process.

Therefore, before threading, you must remove approximately 1/4" of the PVC coating from the end of the conduit. Using a knife, whittle in a pencil-sharpening style, cutting the coating from the conduit. A wire brush may also be used to remove PVC coating.

A band saw cutter usually will not cut the conduit at a "perfect" 90° angle (the accuracy of this cut depends heavily on the skill of the operator).



Cutting with a roller-style cutter



Steel Pipe Cutters  
P70045C, P70060C

Although most personnel in the field prefer a band saw cutter, a roller-style cutter is the recommended tool for cutting Ocal PVC-coated conduit.

A roller-style cutter cuts the edge of the conduit at a bevel and removes 1/4" of the coating at the same time. In addition, a roller-style cutter provides an exact 90° cut in relation to the conduit. No additional removal of PVC coating is necessary.



## Technical information

### Manual and hand-held threading



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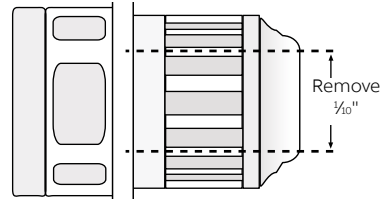
PVC-coated conduit has a larger O.D. than uncoated conduit. Standard dies will not clear the additional thickness. Hand-held as well as power threading devices require a die head for the correct size conduit. The standard die head is factory set for rigid conduit and will not fit over PVC coating.

These die heads are available from Ocal, machined for use with PVC-coated conduit. You can have standard dies machined as well.

If you have dies machined, you will need to adhere to the following procedure:

1. Remove the cover plate and the four die teeth.
2. Have the machinist remove 100 thousandths of an inch ( $1/10''$ ) from the throat and collar diameter of the die head.
3. Replace the dies and cover.

Ridgid Tools #700 threader  
See page F59



01 Throat & Collar Shown

02 Cover Plate Shown

03 The die teeth are cutting tapered threads and will become clogged with PVC and metal shavings.

04 To prevent clogging, use a knife and score the conduit lengthwise from the point where the threads will end to where they begin. This will allow the PVC and metal shavings to fall into the throat of the die head.



01



02



03



04



## Technical information

### Hand-held powered threading



#### Handheld

The Ridgid #12R is typically used for smaller size conduit. The ratchet knob indicates forward and reverse. Die heads snap in from both sides and lock in place. (#12R includes ratchet and handle only)

#### Handheld powered

The Ridgid 700 Power Drive is a heavy duty handheld tool typically used for conduit up to 2 inches diameter. The 700 Power Drive is designed for Ridgid 12R dies, available in both 115V and 230V models. Optional case is available for this tool.



Rothenberger Reamer  
70289  
See page F70

01 Ream the conduit with approved reamers. Spiral and straight-style reamers are both acceptable.

02 Ocal Urethane Patching Compound See pages F63-F64

03 KOPR-SHIELD® See page F62



01



02



03

## Technical information

### Geared threading



Ridgid #700 threader  
See page F59



Geared Threader ("Hog Head")

Geared threaders will thread 2½" through 6" PVC coated conduit. However, geared threaders are typically only used for 5" and 6" conduit. The cutting dies are adjustable and will not require pencil cutting the conduit.

The geared threader requires a clamp screw to secure the conduit, and the clamp screw will penetrate the PVC coating. Make certain the clamp screw is tight; otherwise, it will slip around the conduit and tear the coating. After the threading process is complete, touch up the penetrated area with Ocal exterior PVC patching compound (see pages F63–F64).

Ream the conduit and dress the threads as previously described.

### Stationary power threading



Ridgid Tools 1224  
threader  
See page F58

Stationary power threading machines such as Ridgid model number 1224 have the capacity to thread rigid conduit from ½" to 4".

The standard jaw inserts with these units are intended to secure un-coated rigid conduit. The teeth of the standard jaw inserts will penetrate the PVC coating, but not bite into the steel. As a result, the standard jaw inserts will grind the PVC coating off of the conduit. To prevent this, shell style clamps or jaw inserts for coated conduit may be used.

Jaw inserts for coated conduit – Range: 1/2" to 4"  
The jaw inserts for coated conduit have a wider surface area to effectively grip the PVC coating. Ridgid Catalogue No. 26247 is the jaw insert for coated conduit used in the Ridgid 1224 threading machine.

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### Bending and hand bending



Chicago Bender



Hand Bender  
See page F57

#### Bending

Never use any type of lubricant on the shoes. Use rubbing alcohol to clean the shoe prior to bending

#### Hand bending

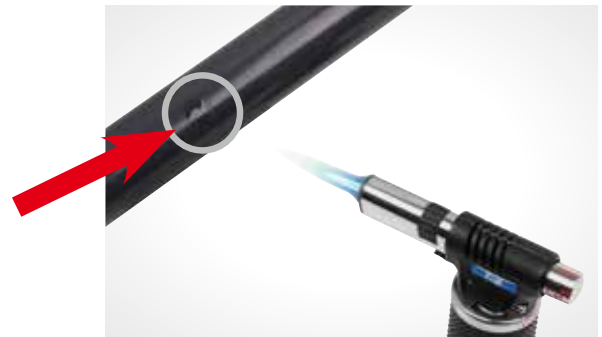
A standard hand bender can be used for saddles, offsets and conventional bending. For PVC-coated conduit, the next larger shoe size from the EMT size should be used. The chart below shows the catalog numbers of the hand benders on page F53 and the corresponding size of PVC-coated conduit on which they should be used.



Ocal Air-Cure  
Patching Compounds  
See page F63



Ocal Heat-Cure Patch  
See page F64



Ocal Heat-Cure Patch offers a thicker consistency at higher ambient temperatures than standard air-cure compounds, ensuring better coverage and a more effective patch in warm weather applications.

Cat. No.	PVC-Coated Conduit Size (mm)
35220	1/2"
35225	3/4"
2424A8	1"

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### Electric bending

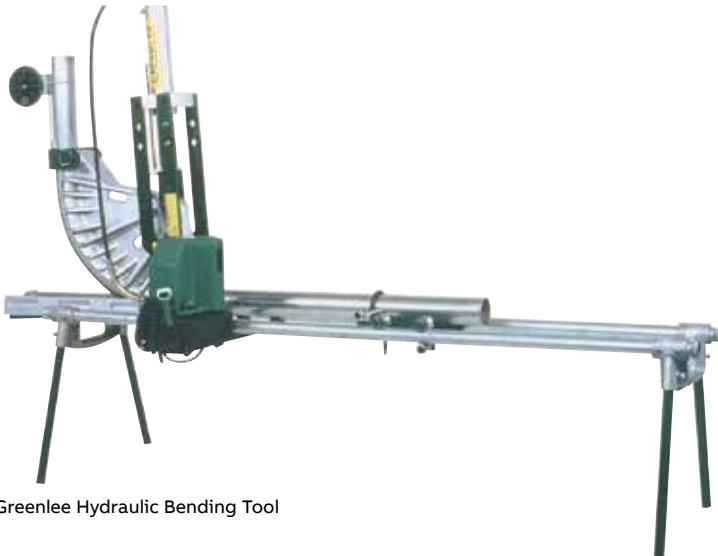


Greenlee® Model 555 Bender and bending accessories for PVC-coated conduit (below)

These machines are designed for bending 1/2" through 2" conduit. The shoes as well as the roller assembly should be of the design for use with PVC-coated conduit. Listed along with the Greenlee® electric bender on page F78 are the bending accessories to equip the machine for PVC-coated conduit.

If you use conventional shoes on an electric bender, the shoes and each of the rollers in the roller assembly must be machined 60 thousandths. Some manufacturers use slide bars instead of a roller assembly, and these, too, must be machined 60 thousandths. Be sure to compensate for "spring back," since PVC coating often requires the setting to be off as much as 5°.

### Hydraulic bending



Greenlee Hydraulic Bending Tool

This is the preferred style of bending for 2 1/2" and larger size conduit. The shoe assembly should be of the design for PVC-coated conduit. The roller wheel and/or slide bar will accommodate PVC-coated conduit without the need for machining.

**Note**

Sequential bends can be manufactured by Ocal upon request. 5" and 6" conduit must be bent at the factory.



Shoe for Greenlee Hydraulic Bending Tool

## Technical information

### NEMA Standards Publication No. RN 1–2005

#### Section 3 – External coatings

##### 3.1 Thickness

The thickness of polyvinyl chloride (PVC) coatings shall be a nominal .040 in. (1.02mm). The tolerance on the coating thickness shall be +.010 in. (.25mm) or -.005 in. (.13mm).

##### 3.2 Coating Material

The PVC coating shall have the properties specified in Table 3.1.

Properties of PVC coatings – Table 3.1

Property	Minimum Requirement	ASTM Test Method
Hardness:		
Shore A	75	D 2240
Shore D	25	D 2240
Tensile Strength	2,000 psi	D 638
Elongation	200%	D 638
Dielectric Strength	325 volts per mil	D 149
Brittleness Temperature	5° F	D 1790

##### 3.3 Application of coating

###### 3.3.1 Cleaning

The exterior surface that is to receive the coating shall be free of grease, oil, dirt and other extraneous matter. The surface shall be cleaned in such a manner that the galvanized surface of the conduit is not harmed or eroded.

###### 3.3.2 Priming

The cleaned exterior surface shall be primed with an adhesive suitable for use with the PVC coating material to be applied.

###### 3.3.3 Coating

The PVC material shall be applied in powder, plastisol or pellet form by a manufacturing method which will produce a finished product conforming to these standards.

##### 3.4 Elbows

Coated elbows shall be used with coated conduit. The thickness of the coating on elbows shall be in accordance with Section 3.1.

##### 3.5 Couplings

Coated couplings shall be used with coated conduit. The thickness of the coating on couplings shall be at least equal to the thickness of the coating on the conduit.

Each coated coupling shall have a flexible PVC sleeve which extends from each end of the coupling and which will overlap the PVC coating on the conduit when the coupling has been installed on the conduit.

The length of the sleeve extension(s) shall be at least equivalent to the nominal conduit size for sizes up through NPS 2 (53). For sizes NPS 2½ (63) through NPS 6 (155), the length of the sleeve extension(s) shall be at least 2 in. (50.8mm).

The PVC sleeve shall be a nominal thickness of .040 in (1.02mm). The inside diameter (I.D.) of the overlapping sleeve shall be less than the outside diameter (O.D.) of the PVC-coated conduit.

##### 3.6 Workmanship and appearance

The PVC coating shall be free of blisters, bubbles and pinholes. The PVC coating shall be continuous over the entire length of the conduit except at the threads and shall be holiday-free at the time of manufacture.

A holiday is herein defined as an electrical discontinuity of less than 80,000 ohms equivalent resistance sensed with a cellulose sponge wet with a suitable electrolyte and measured with an appropriate low voltage directcurrent instrument. A suitable electrolyte is a solution containing tap water, 3.0% salt (sodium chloride) and .5% liquid detergent.

The inside of the PVC-coated conduit, couplings and elbows shall be free of the PVC coating material.

All sleeve extensions shall be square cut.

##### 3.7 Performance requirements

Typical physical requirements for PVC-coated conduit are given in Table 3.2.

Typical physical properties of PVC-coated rigid conduit and IMC– Table 3.2

Property	Requirement*	Test Method
Abrasion Resistance	200 hours, no failure	ASTM G6
Bendability, radius (at 73.4° ± 1.8°F) (at 23° ± 16.8°F)	9 in. (228.6mm)	ASTM G10
Artificial Weathering	Minimum 1,000 hours, no adverse effect	ASTM G153

\* The above requirements are based on testing a .040 in. (1.02mm) PVC coating applied over NPS ¾ inch galvanized rigid steel conduit. See Section 1 for information on the ASTM test methods.

##### 3.8 Adhesion

The adhesion of the PVC coating to the conduit shall be greater than the strength of the coating itself. This shall be determined by making two circumferential cuts, above ½ in. (12.7mm) apart, through the plastic to the substrate. A third cut shall be made perpendicular to and crossing the circumferential cuts. The edge of the plastic shall be carefully lifted with a knife to form a plastic tab. This tab shall be pulled perpendicular to the conduit with a pair of pliers. The plastic tab shall tear rather than any additional coating film separating from the substrate.