



# HARDWARE MOUNTING HOLES BORING GUIDE FOR METAL RAILINGS

August 1, 2008

## TABLE OF CONTENTS

<b>Boring Diagrams and Instructions</b>	<b>Page</b>
Adjust-A-Body® and Adjust-A-Jaw® Tensioners and Fixed Jaws.....	2
Invisiware® Clip-on Stops .....	3
Invisiware® Fix Tabs .....	4
Invisiware® Radius Ferrules .....	5-7
Invisiware® Receivers .....	8-11
Invisiware® Swaging Studs .....	12
Invisiware® Threaded Tabs .....	12
Invisiware® Welded Receivers.....	13
Push-Lock™ and Pull-Lock™ Stop-End (non-tensioning) Fittings.....	14-17
Receiver with Push-Lock™ Stud Fittings.....	18-19
Intermediate Posts and Cable Braces.....	20-21
Tubed Corner Sections, including Tubing Specifications.....	22
Vertical Railings .....	23

Cable Art, Inc.  
25334 Avenue Stanford  
Valencia, CA 91355  
877-664-4224

(661) 257-7522  
Fax (661) 257-7502

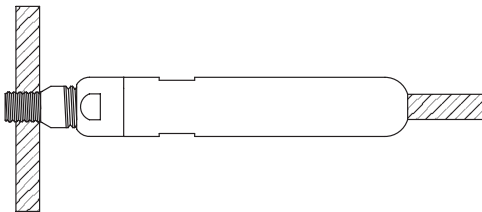
e-mail: [sales@cableart.com](mailto:sales@cableart.com)  
[www.cableart.com](http://www.cableart.com)

# BORING INSTRUCTIONS

## ADJUST-A-BODY® TENSIONER WITH THREADED BOLT

Drill and tap holes as indicated below:

Part No.	Used with Cable Dia.	Drill and Tap Hole
20ATB4	1/8"	5/16-24
	3/16"	
20ATB8	1/4"	




A side-view diagram of the Adjust-A-Body Tensioner with Threaded Bolt. It shows a cylindrical body with a threaded end on the left and a cable attachment on the right. An arrow points from the 'Drill and Tap Hole' column of the table to the threaded end of the device.

## ADJUST-A-BODY® TENSIONER WITH THREADED EYE

If part is being mounted using an Invisiware® Fixed Tab or Threaded Tab, see boring instructions for those parts.

If part is being mounted to a structural tee, angle iron or steel plate, drill holes as indicated below:

Part No.	Used with Cable Dia.	Hole Dia.	Max Dimension from Front Edge of Mounting Surface to Hole Center
20ATE4	1/8"	.313"	.375"
	3/16"		
20ATE8	1/4"	.438"	.500"



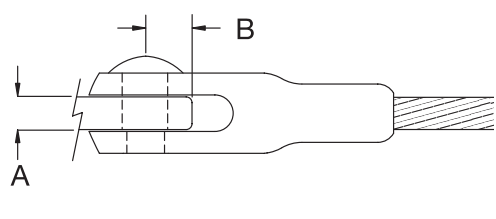
A side-view diagram of the Adjust-A-Body Tensioner with Threaded Eye. It shows a cylindrical body with a threaded eye on the left and a cable attachment on the right. An arrow points from the 'Max Dimension from Front Edge of Mounting Surface to Hole Center' column of the table to the threaded eye.

## ADJUST-A-JAW® TENSIONER AND ULTRA-TEC® FIXED JAW

If part is being mounted using an Invisiware® Fixed Tab or Threaded Tab, see boring instructions for those parts.

If part is being mounted to a structural tee, angle iron or steel plate, drill holes as indicated below:

Part No.	Used with Cable Dia.	Hole Dia.	B Max Dimension from Front Edge of Mounting Surface to Hole Center	A Jaw Opening
20AAJ4	1/8"	.313"	.375"	.260"
	3/16"			
20AAJ8	1/4"	.438"	.500"	.390"
20AAJ10	5/16"			
	3/8"			

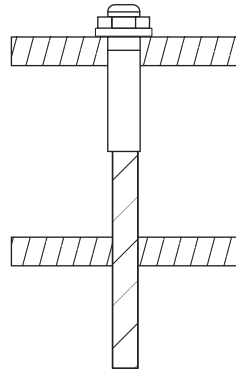
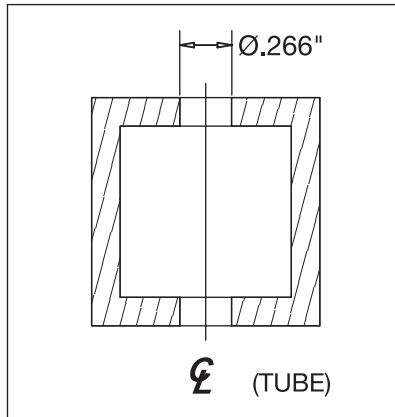


A side-view diagram of the Adjust-A-Jaw Tensioner and Ultra-Tec Fixed Jaw. It shows a cylindrical body with a jaw opening on the left and a cable attachment on the right. Dimension lines 'A' and 'B' are shown. 'A' indicates the jaw opening, and 'B' indicates the maximum dimension from the front edge of the mounting surface to the hole center.

# BORING INSTRUCTIONS

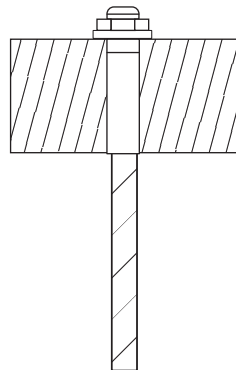
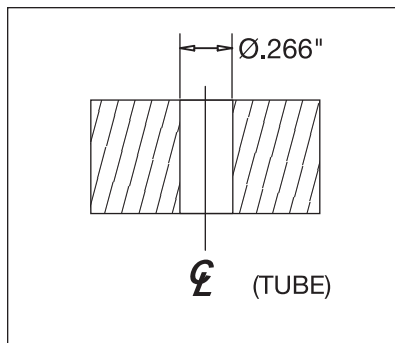
## CLIP-ON STOP

Used with square or rectangular structural steel tubing.  
We recommend a minimum 1/4" wall.



Clip-on Stop  
with square or rectangular  
structural steel tubing.

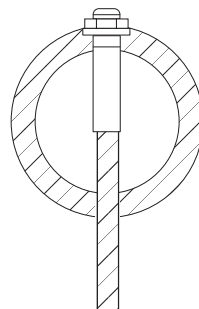
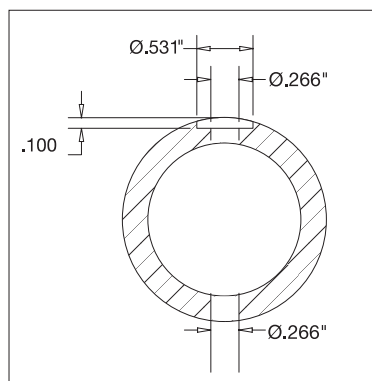
Used with flat bar.



Clip-on Stop with  
flat bar.

Used with minimum SC80 round pipe or round steel tubing.

If using round steel tubing, wall thickness should be at least comparable to schedule 80 pipe.

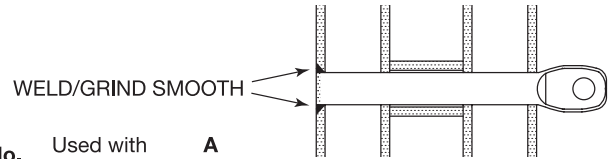
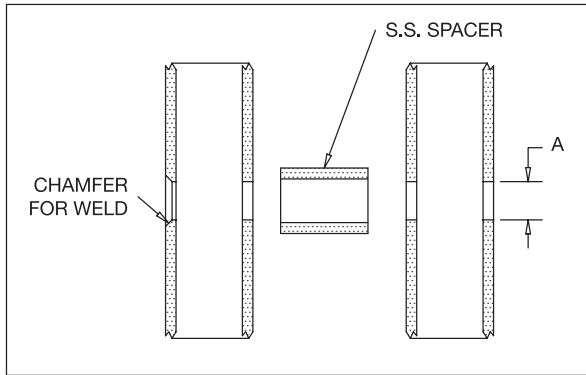


Clip-on Stop with  
round pipe or steel tubing.

# BORING INSTRUCTIONS

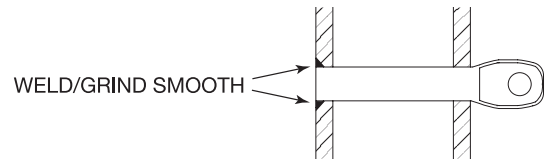
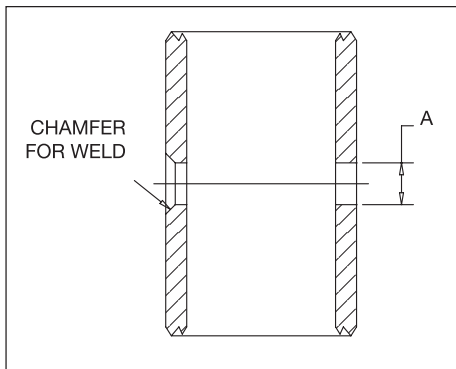
## FIXED TAB

Used with double end post construction using 2"x1" or 3"x1" rectangular tubing with 1-inch spacers.

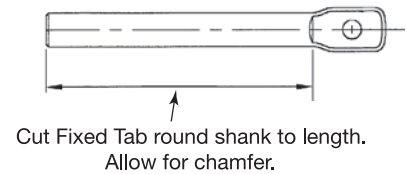


Part No.	Used with Cable Dia.	A Hole Dia.
20HFT4A	1/8"	.375"
20HFT4B	3/16"	
20HFT8A	1/4"	.562"
20HFT8B		

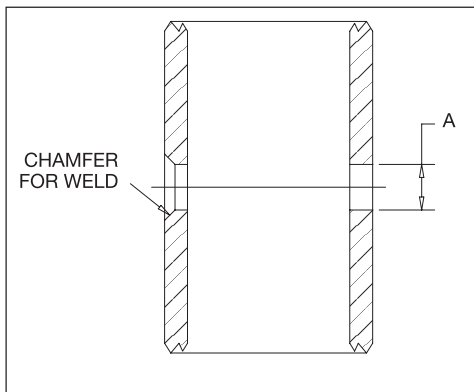
Used with square or rectangular tubing with minimum .250" wall thickness, or round steel tubing with wall thickness at least comparable to SC80 pipe.



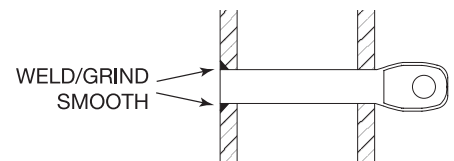
Part No.	Used with Cable Dia.	A Hole Dia.
20HFT4A	1/8"	.375"
20HFT4B	3/16"	
20HFT8A	1/4"	.562"
20HFT8B		



Used with minimum SC80 pipe.



Part No.	Used with Cable Dia.	A Hole Dia.
20HFT8A	1/8"	.375"
20HFT8B	3/16"	
20HFT8A	1/4"	.562"
20HFT8B		



Cut Fixed Tab round shank to length as follows:  
 1-1/4" std. Sc 80 Pipe: 1.60"  
 1-1/2" std. Sc 80 Pipe: 1.84"  
 2" std. Sc 80 Pipe: 2.31"



# BORING INSTRUCTIONS

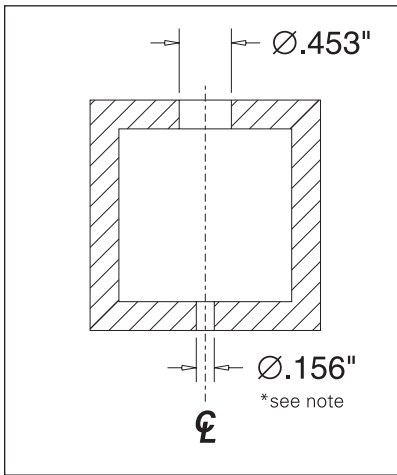
## INVISIWARE® RADIUS FERRULE

Used with square or rectangular tubing. We recommend a minimum 1/4" wall.

Part No. 20FRF4

Cable Dia: 1/8"

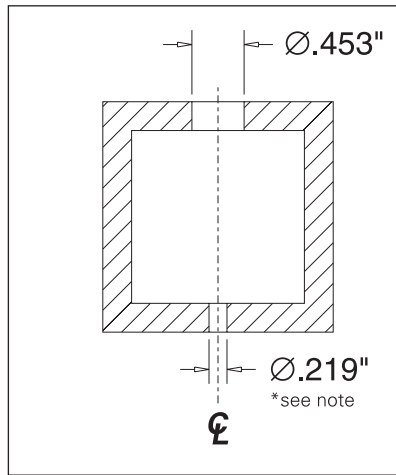
\*see note if using grommets



Part No. 20FRF6

Cable Dia: 3/16"

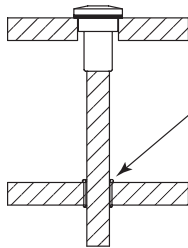
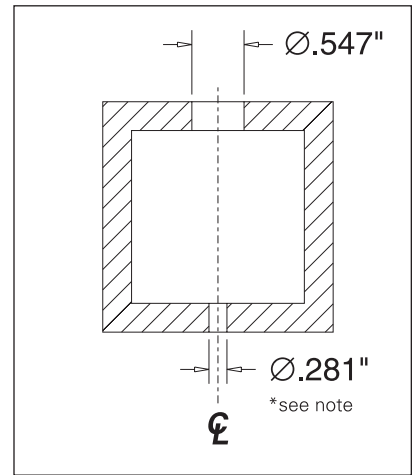
\*see note if using grommets



Part No. 20FRF8

Cable Dia: 1/4"

\*see note if using grommets

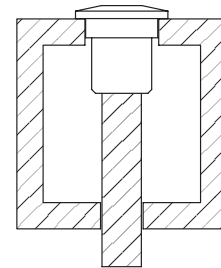


\*Note: If grommets are being used, hole through which cable passes should be drilled as follows:

20FRF4: .250"

20FRF6: .250"

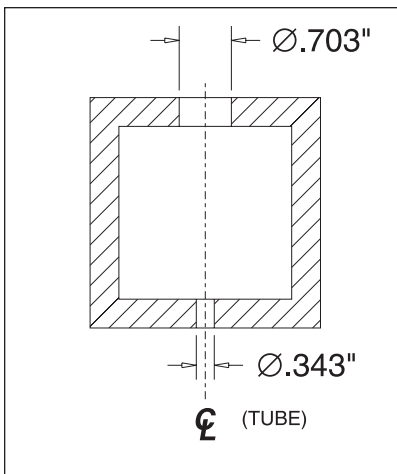
20FRF8: .312"



(TUBE)

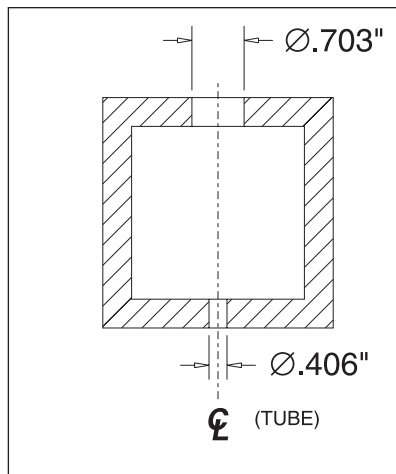
Part No. 20FRF10

Cable Dia: 5/16"



Part No. 20FRF12

Cable Dia: 3/8"



Invisiware® Radius Ferrule with square or rectangular tubing.

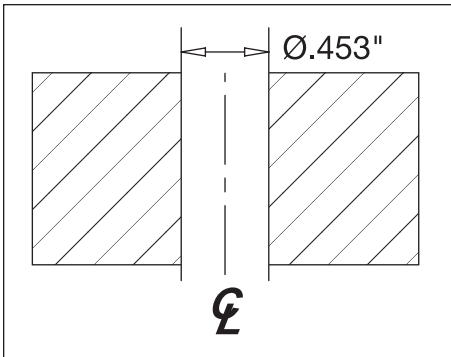
Grommets are not offered for use with 20FRF10 and 20FRF12 Radius Ferrules.

# BORING INSTRUCTIONS

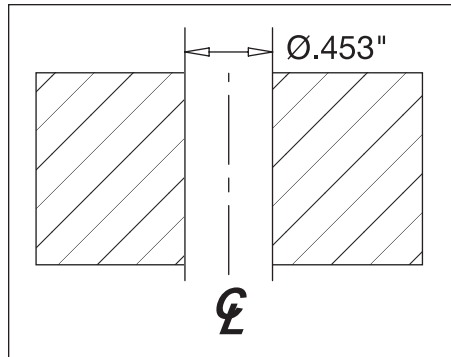
## INVISIWARE® RADIUS FERRULE

Used with flat bar or steel plate.

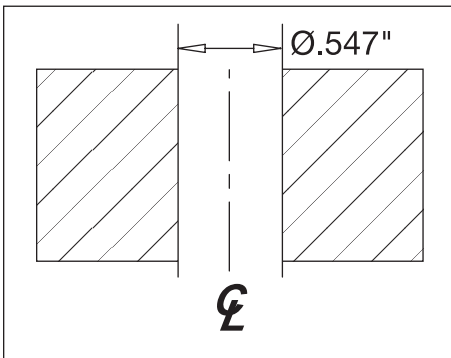
Part No. 20FRF4  
Cable Dia: 1/8"



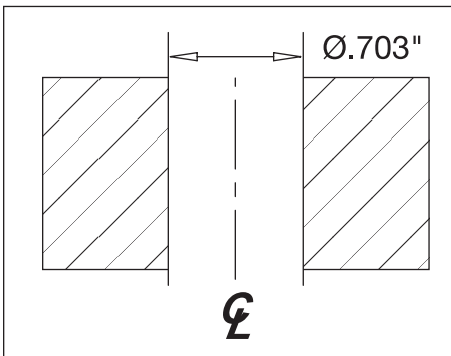
Part No. 20FRF6  
Cable Dia: 3/16"



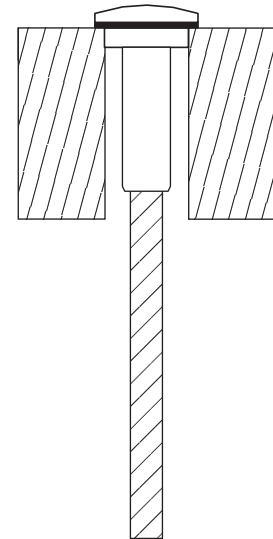
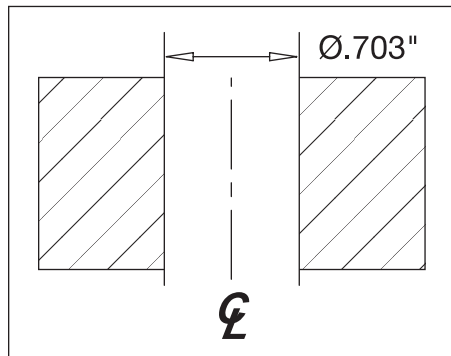
Part No. 20FRF8  
Cable Dia: 1/4"



Part No. 20FRF10  
Cable Dia: 5/16"



Part No. 20FRF12  
Cable Dia: 3/8"



Invisiware® Radius Ferrule  
with flat bar or steel plate.

# BORING INSTRUCTIONS

## INVISIWARE® RADIUS FERRULE

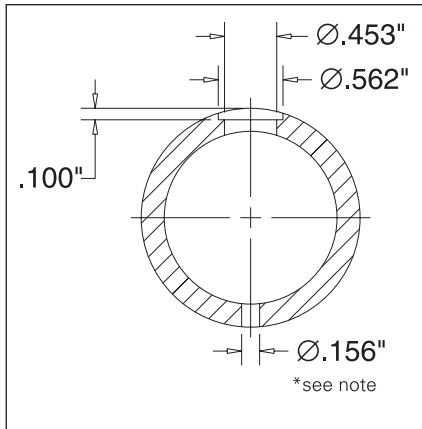
Used with minimum SC80 round pipe or round steel tubing.

If using round steel tubing, wall thickness should be at least comparable to SC80 pipe.

**Part No. 20FRF4**

**Cable Dia: 1/8"**

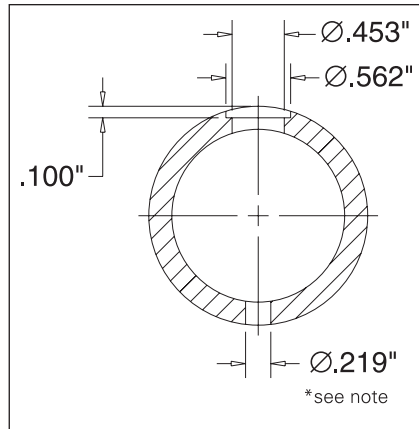
**\*see note if using grommets**



**Part No. 20FRF6**

**Cable Dia: 3/16"**

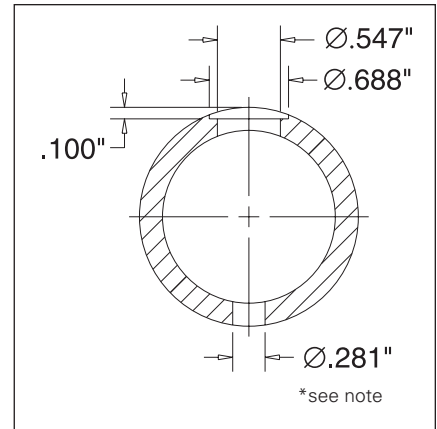
**\*see note if using grommets**



**Part No. 20FRF8**

**Cable Dia: 1/4"**

**\*see note if using grommets**

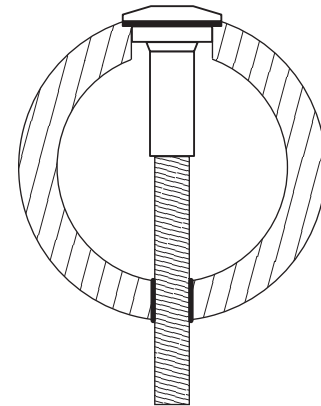


**\*Note:** If grommets are being used, hole through which cable passes should be drilled as follows:

**20FRF4: .250"**

**20FRF6: .250"**

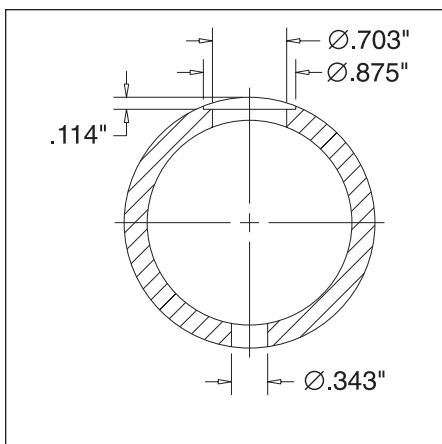
**20FRF8: .312"**



**Invisiware® Radius Ferrule  
with round pipe or  
round steel tubing.**

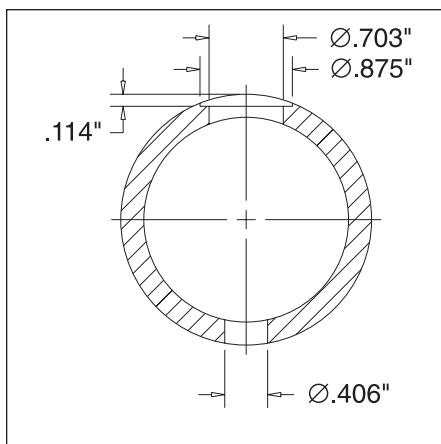
**Part No. 20FRF10**

**Cable Dia: 5/16"**



**Part No. 20FRF12**

**Cable Dia: 3/8"**



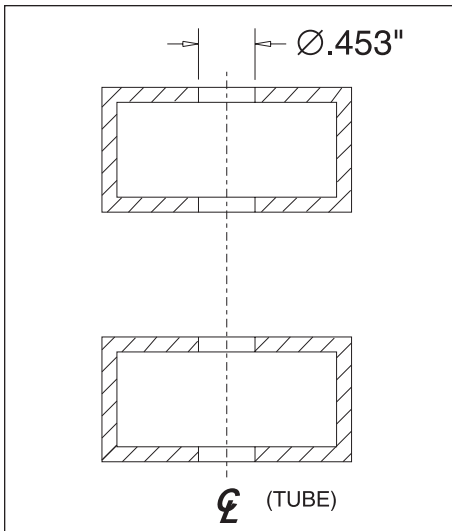
Grommets are not offered for use with 20FRF10 and 20FRF12 Radius Ferrules.

# BORING INSTRUCTIONS

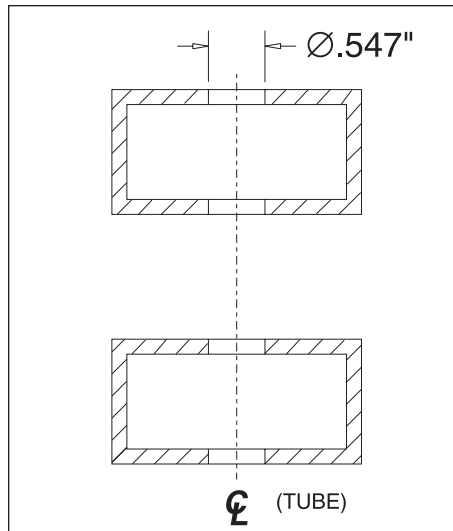
## INVISIWARE® RECEIVER

Used with double end post construction using 2"x1" or 3"x1" rectangular tubing with 1-inch spacers.

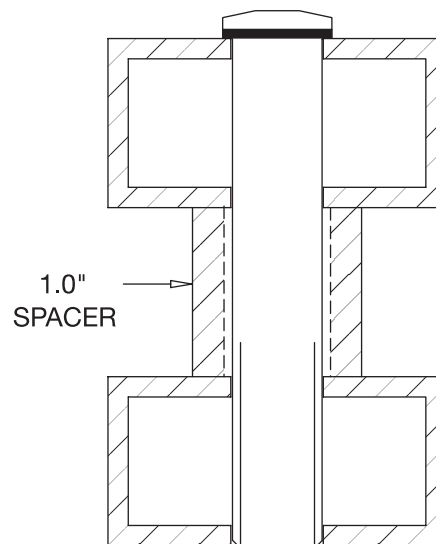
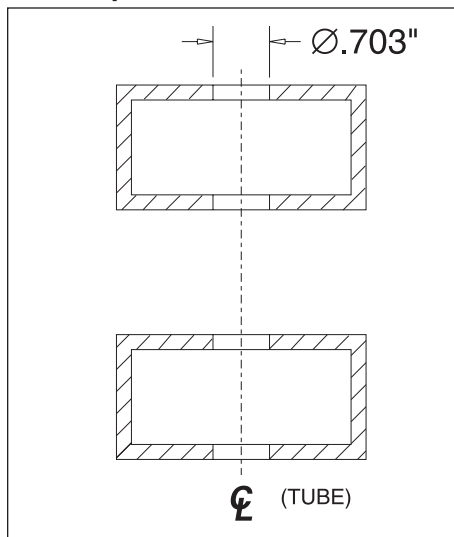
Part Nos.  
20F4012 through 20F4062  
Cable Dia: 1/8" and 3/16"



Part Nos.  
20F8022 through 20F8052  
Cable Dia: 1/4"



Part Nos.  
20F1232 through 20F1252  
Cable Dia: 5/16" and 3/8"  
Drill 4 places



Invisiware® Receiver used with double end post construction using rectangular tubing with 1-inch spacers.

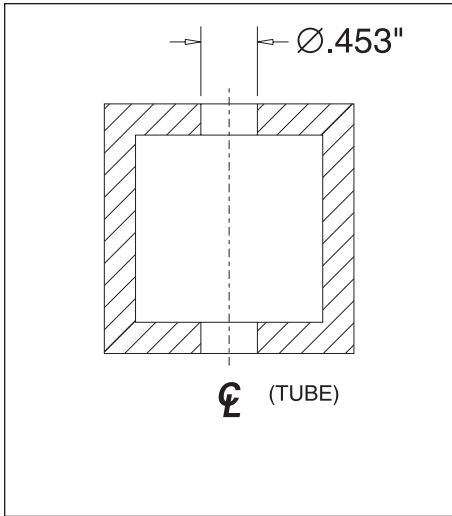


# BORING INSTRUCTIONS

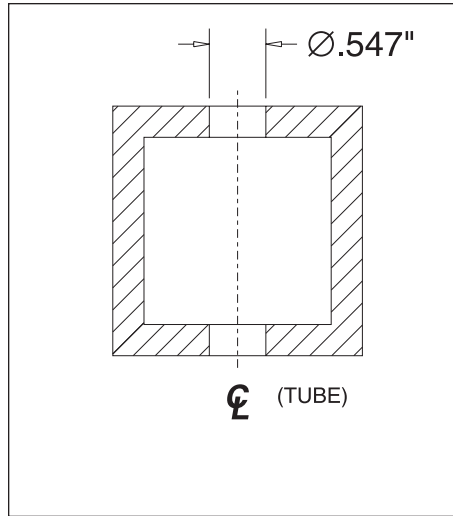
## INVISIWARE® RECEIVER

Used with square or rectangular tubing. We recommend a minimum 1/4" wall.

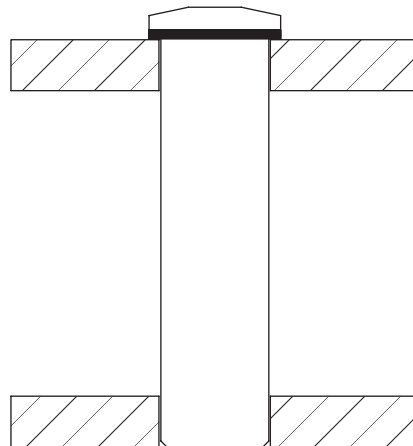
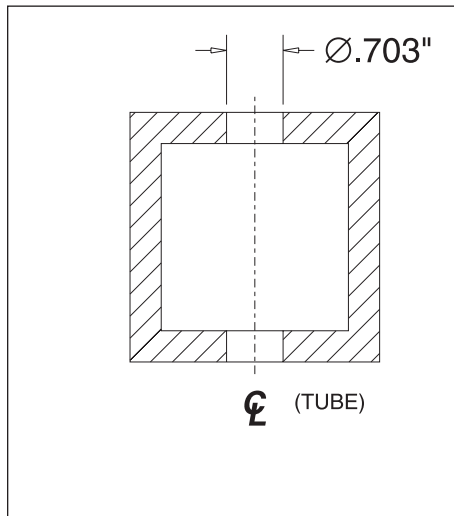
Part Nos.  
20F4012 through 20F4062  
Cable Dia: 1/8" and 3/16"  
Drill 2 places



Part Nos.  
20F8022 through 20F8052  
Cable Dia: 1/4"  
Drill 2 places



Part Nos.  
20F1232 through 20F1252  
Cable Dia: 5/16" and 3/8"  
Drill 2 places



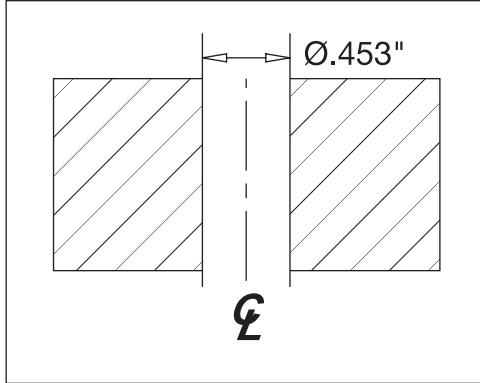
Invisiware® Receiver used square or rectangular tubing.

# BORING INSTRUCTIONS

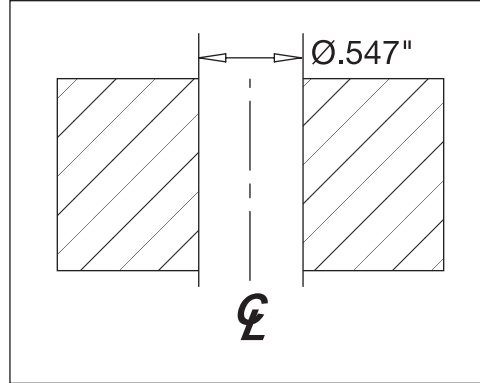
## INVISIWARE® RECEIVER

Used with flat bar or steel plate.

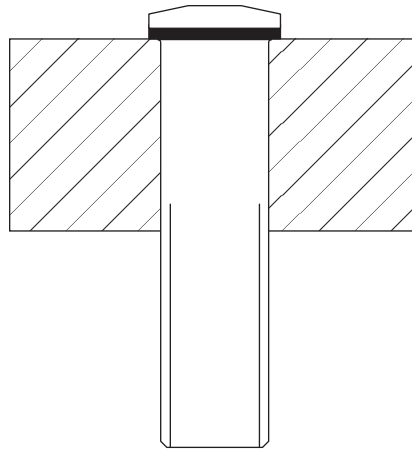
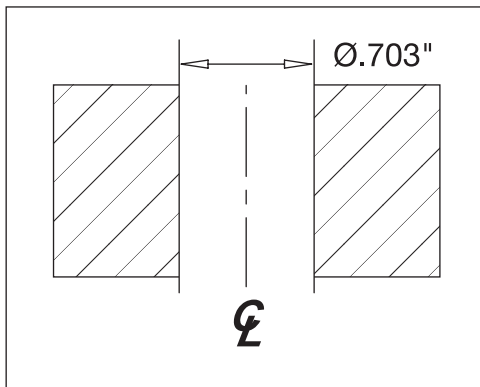
Part Nos.  
20F4012 through 20F4062  
Cable Dia: 1/8" and 3/16"



Part Nos.  
20F8022 through 20F8052  
Cable Dia: 1/4"



Part Nos.  
20F1232 through 20F1252  
Cable Dia: 5/16" and 3/8"



Invisiware® Receiver used with  
flat bar or steel plate.

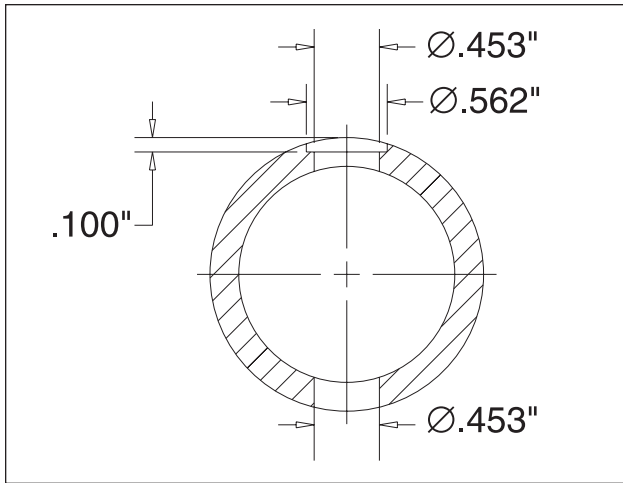
# BORING INSTRUCTIONS

## INVISIWARE® RECEIVER

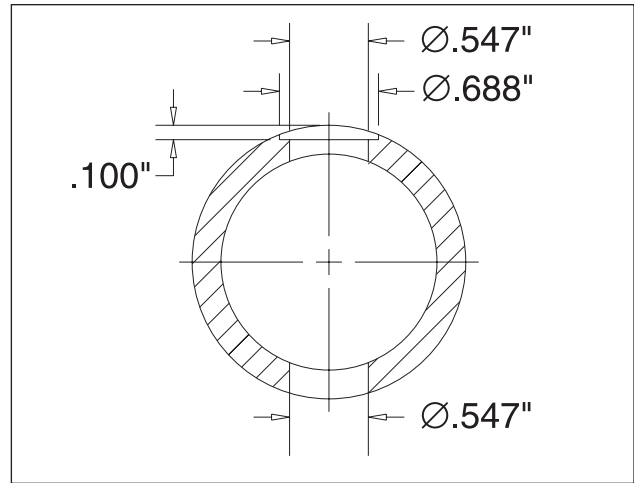
Used with minimum SC80 round pipe or round steel tubing.

If using round steel tubing, wall thickness should be at least comparable to SC80 pipe.

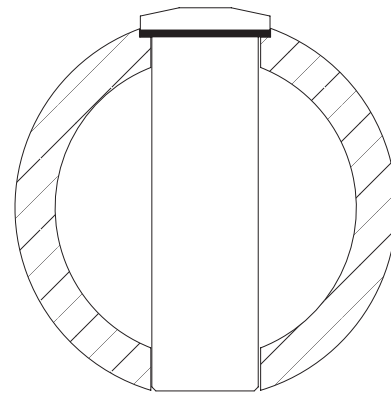
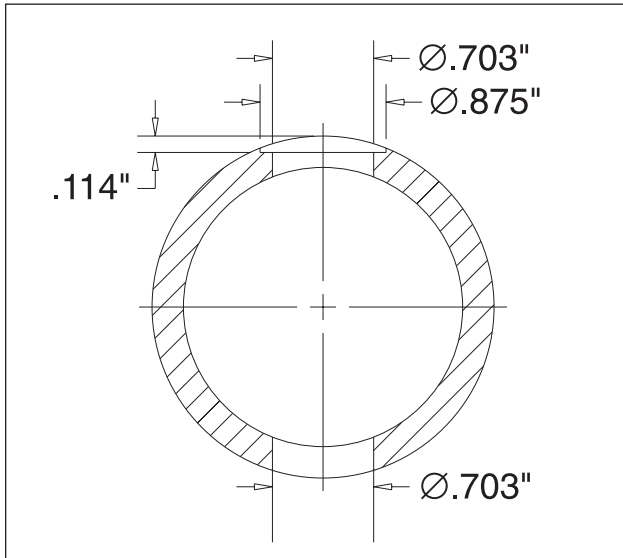
Part Nos.  
20F4012 through 20F4062  
Cable Dia: 1/8" and 3/16"



Part Nos.  
20F8022 through 20F8052  
Cable Dia: 1/4"



Part Nos.  
20F1232 through 20F1252  
Cable Dia: 5/16" and 3/8"



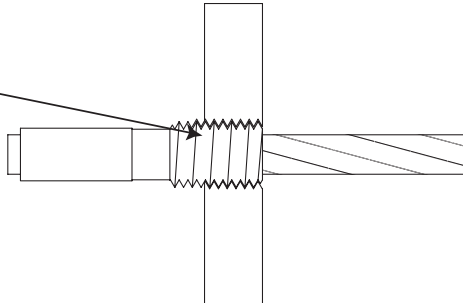
Invisiware® Receiver used  
with pipe.

# BORING INSTRUCTIONS

## INVISIWARE® SWAGING STUD

Used in drilled and tapped hole in end post as indicated below (\*see Note).

Part No.	Cable Dia.	Drill and Tap Hole
20FS4 20FS6	1/8"	5/16 - 24
	3/16"	
20FS8	1/4"	7/16 - 20
20FS10 20FS12	5/16"	9/16 - 18
	3/8"	



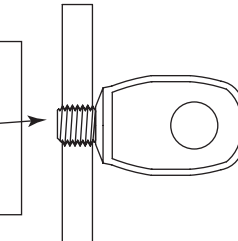
**Construction Material** \*Note: Recommended minimum wall thicknesses:

Pipe	Minimum Schedule 80
Round Steel Tubing	At least equivalent to Schedule 80 Pipe
Square or Rectangular Structural Steel Tubing	.250"
Steel Flat Bar or Plate	.250" or heavier to support a load of 1,537 lbs. on the Swaging Stud. <i>We do not recommend 1/4" flat bar as an end post.</i>

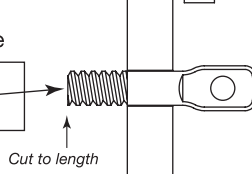
## INVISIWARE® THREADED TAB

Drill and (if applicable) tap holes in end post as indicated below (\*see Note).

Part No.	Cable Dia.	Drill and Tap Hole
20HTT4	1/8"	5/16 - 24
	3/16"	
20HTT8	1/4"	
	5/16"	
	3/8"	



Part No.	Cable Dia.	Drill Hole
20HXTT4	1/8"	.4375"
	3/16"	



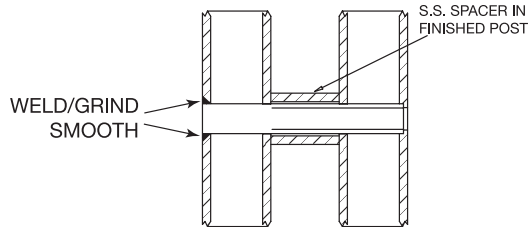
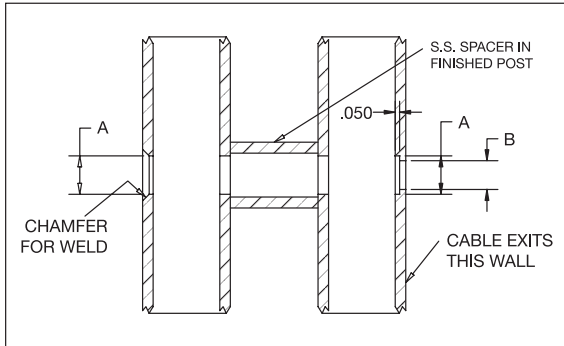
**Construction Material** \*Note: Recommended minimum wall thicknesses:

Pipe	Minimum Schedule 80
Round Steel Tubing	At least equivalent to Schedule 80 Pipe
Square or Rectangular Structural Steel Tubing	.250"

# BORING INSTRUCTIONS

## INVISIWARE® WELDED RECEIVER

Used with double end post construction using 2"x1' or 3"x1" rectangular tubing with 1-inch spacers.

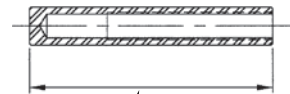
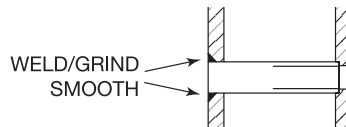
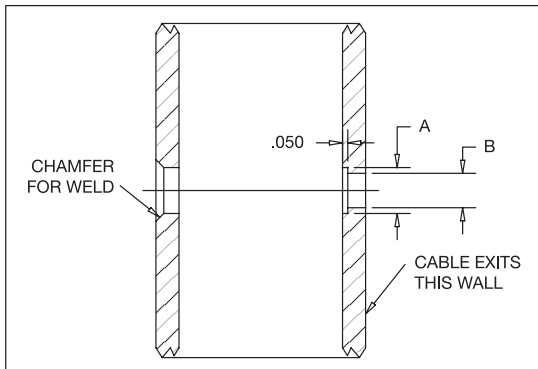


Part No.	Used with Cable Dia.	Hole Diameters	
		A	B
20FWR4A	1/8"	.437"	.328"
20FWR4B	3/16"	.437"	.328"
20FWR8A	1/4"	.531"	.453"
20FWR8B	1/4"	.531"	.453"

Note: When properly installed, the Welded Receiver will rest against the lip of the inside wall through which the cable exits.

Used with square or rectangular tubing with minimum .250" wall thickness, or round steel tubing with wall thickness at least comparable to SC80 pipe.

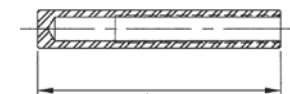
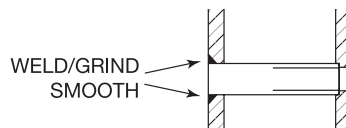
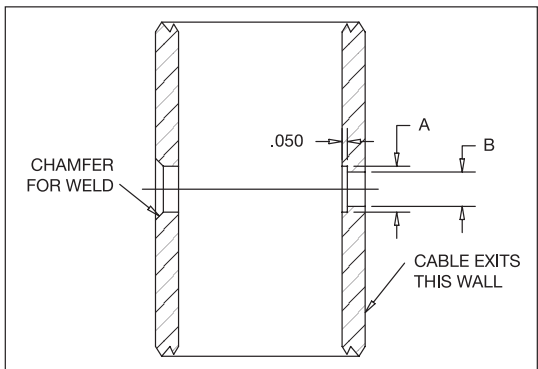
If using round steel tubing, wall thickness must be at least comparable to SC80 pipe.



Part No.	Used with Cable Dia.	Hole Diameters	
		A	B
20FWR4A	1/8"	.437"	.328"
20FWR4B	3/16"	.437"	.328"
20FWR8A	1/4"	.531"	.453"
20FWR8B	1/4"	.531"	.453"

Note: Cut Welded Receiver to length. Allow for dimension for part to rest against the lip on the inside wall through which the cable exits.

Used with minimum SC80 round pipe.



Part No.	Used with Cable Dia.	Hole Diameters	
		A	B
20FWR4A	1/8"	.437"	.328"
20FWR4B	3/16"	.437"	.328"
20FWR8A	1/4"	.531"	.453"
20FWR8B	1/4"	.531"	.453"

Cut Welded Receiver to length as follows:

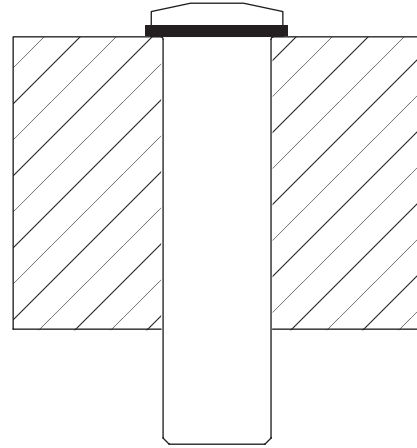
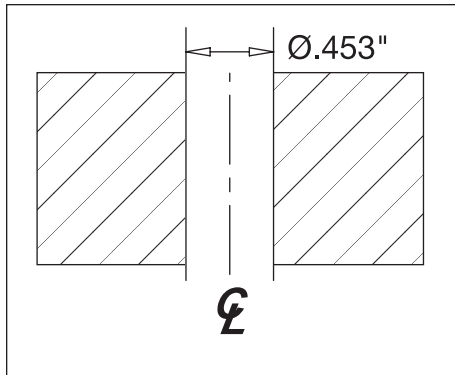
1-1/4" std. Sc 80 Pipe: 1.44"  
 1-1/2" std. Sc 80 Pipe: 1.675"  
 2" std. Sc 80 Pipe: 2.137"

# BORING INSTRUCTIONS

## PUSH-LOCK™ and PULL-LOCK™ STOP-END FITTINGS

Used with flat bar or steel plate.

Cable Dia: 1/8" and 3/16"

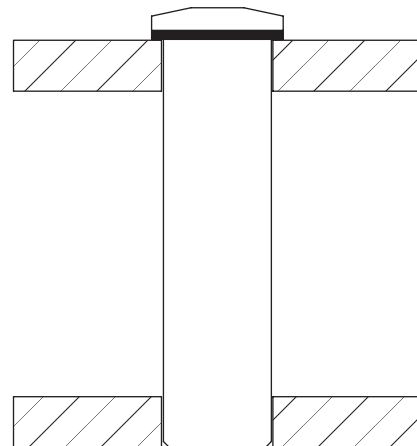
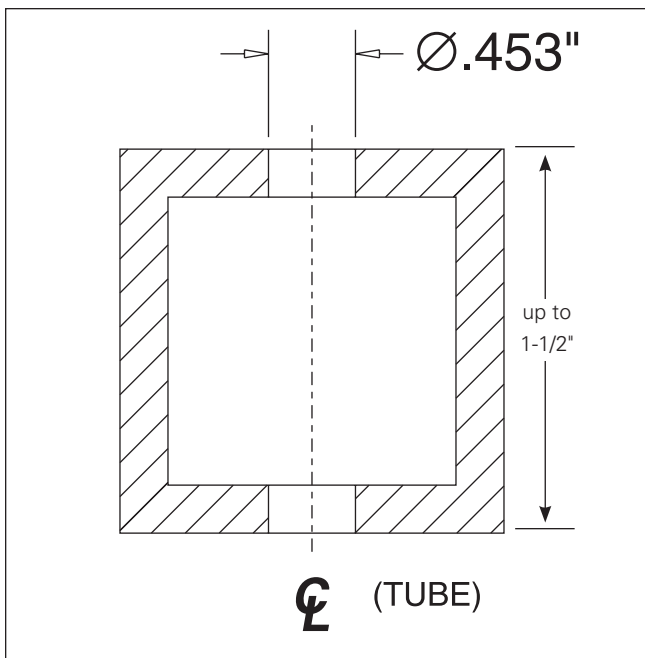


Push-Lock™ or Pull-Lock™ fitting used with flat bar or steel plate.

## PUSH-LOCK™ and PULL-LOCK™ STOP-END FITTINGS

Used with square or rectangular tubing up to 1-1/2" in through direction. We recommend a minimum 1/4" wall.

Cable Dia: 1/8" and 3/16"



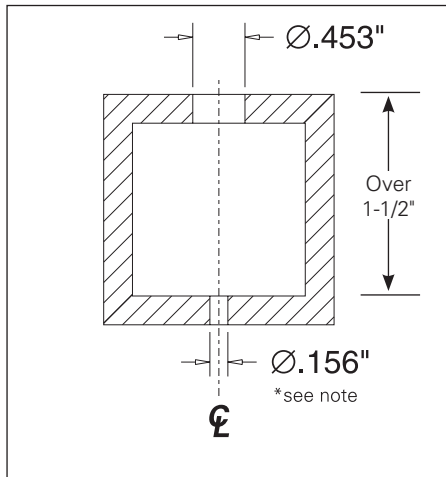
Push-Lock™ or Pull-Lock™ fitting used with square or rectangular tubing.

# BORING INSTRUCTIONS

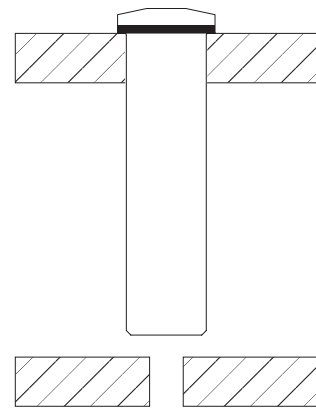
## PUSH-LOCK™ and PULL-LOCK™ STOP-END FITTINGS

Used with square or rectangular tubing over 1-1/2" outside-to-inside tube dimension in through direction. We recommend a minimum 1/4" wall.

Cable Dia: 1/8" \*see note if using grommets



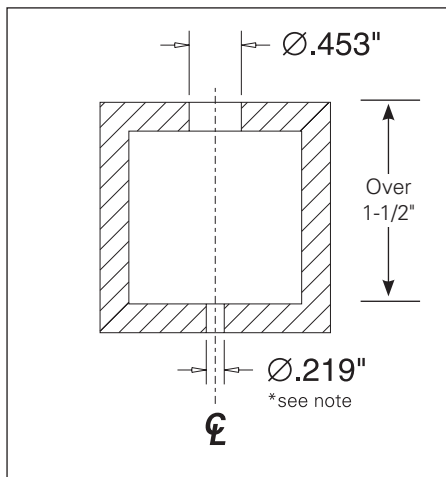
\*Note: If grommets are being used, hole through which cable passes should be .250".



## PUSH-LOCK™ and PULL-LOCK™ STOP-END FITTINGS

Used with square or rectangular tubing over 1-1/2" outside-to-inside tube dimension in through direction. We recommend a minimum 1/4" wall.

Cable Dia: 3/16" \*see note if using grommets



\*Note: If grommets are being used, hole through which cable passes should be .250".

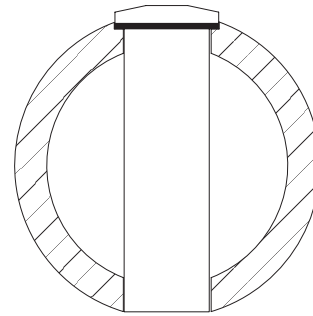
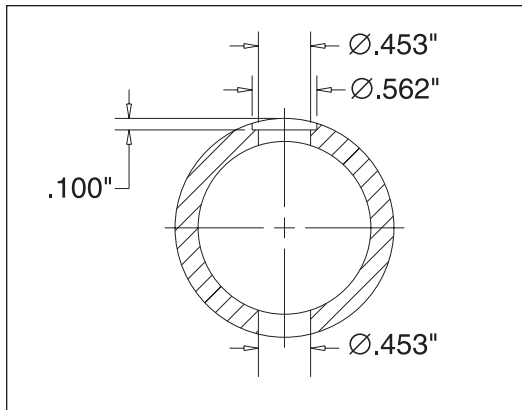
Push-Lock™ or Pull-Lock™ fitting used with square or rectangular tubing.

# BORING INSTRUCTIONS

## PUSH-LOCK™ and PULL-LOCK™ STOP-END FITTINGS

Used with minimum SC80 1-1/4" round pipe or round steel tubing with comparable dimensions.

Cable Dia: 1/8" and 3/16"



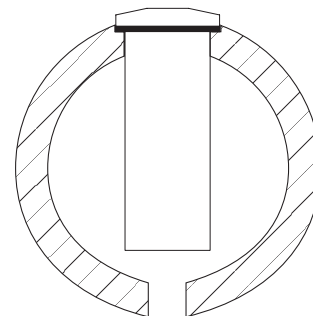
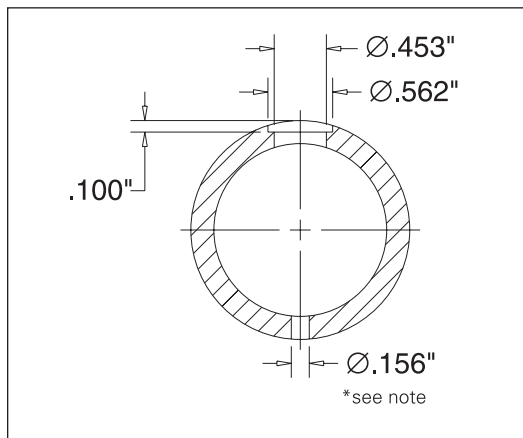
Push-Lock™ or Pull-Lock™ fitting used with round pipe or tubing.

## PUSH-LOCK™ and PULL-LOCK™ STOP-END FITTINGS

Used with minimum SC80 1-1/2" or larger round pipe or round steel tubing with comparable dimensions.

Cable Dia: 1/8"

\*see note if using grommets



Push-Lock™ or Pull-Lock™ fitting used with 1-1/2" or larger diameter round pipe or comparable tubing.

\*Note: If grommets are being used, hole through which cable passes should be .250".



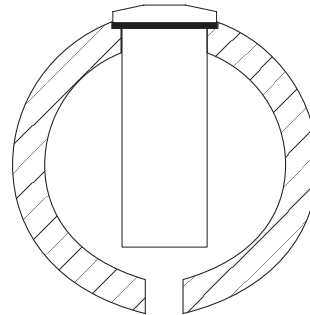
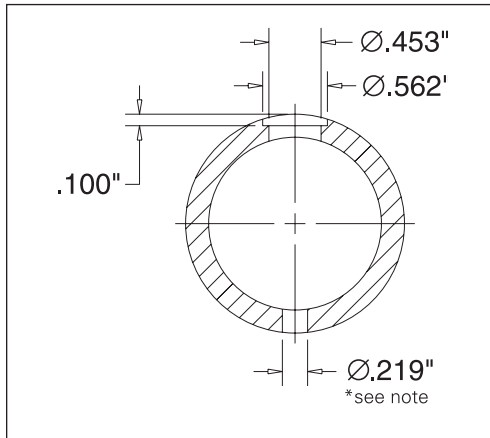
# BORING INSTRUCTIONS

## PUSH-LOCK™ and PULL-LOCK™ STOP-END FITTINGS

Used with minimum SC80 1-1/2" or larger round pipe or round steel tubing with comparable dimensions.

Cable Dia: 3/16"

\*see note if using grommets



Push-Lock™ or Pull-Lock™ fitting used with 1-1/2" or larger diameter round pipe or comparable tubing.

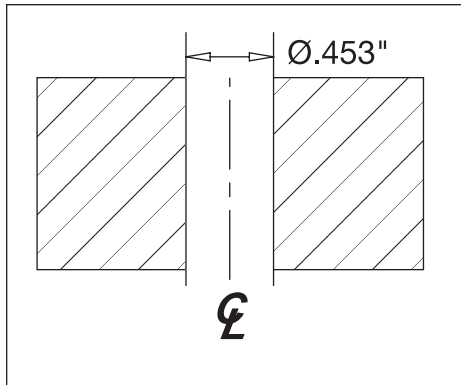
\*Note: If grommets are being used, hole through which cable passes should be .250".

# BORING INSTRUCTIONS

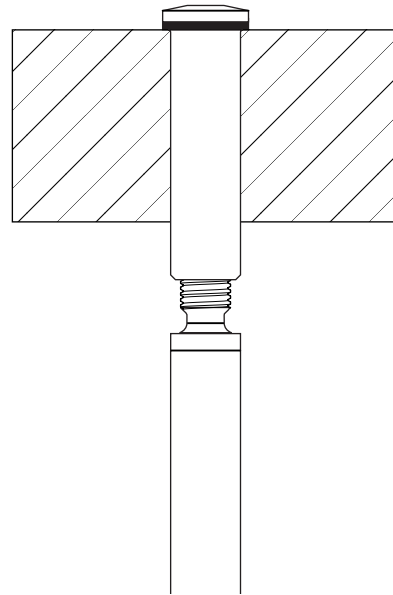
## RECEIVER WITH PUSH-LOCK™ STUD

Used with flat bar or steel plate.

Cable Dia: 1/8" and 3/16"



Receiver with Push-Lock™ Stud used with flat bar or steel plate.

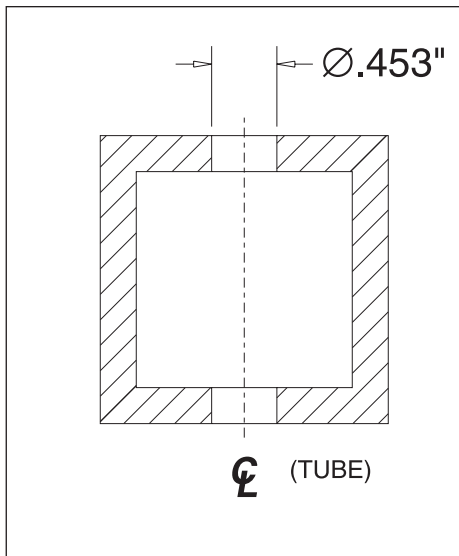


## RECEIVER WITH PUSH-LOCK™ STUD

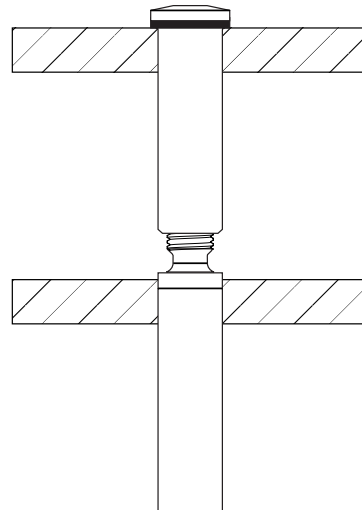
Used with square or rectangular tubing.

We recommend a minimum 1/4" wall.

Cable Dia: 1/8" and 3/16"



Receiver with Push-Lock™ Stud used with square or rectangular tubing.



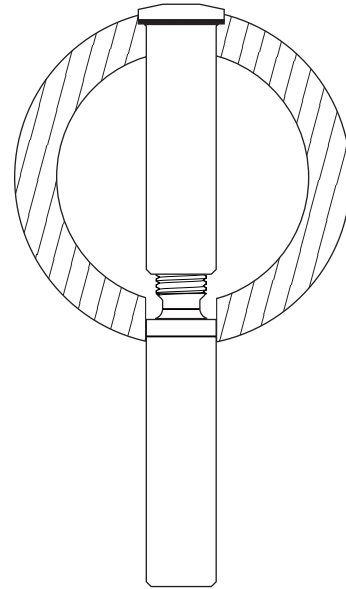
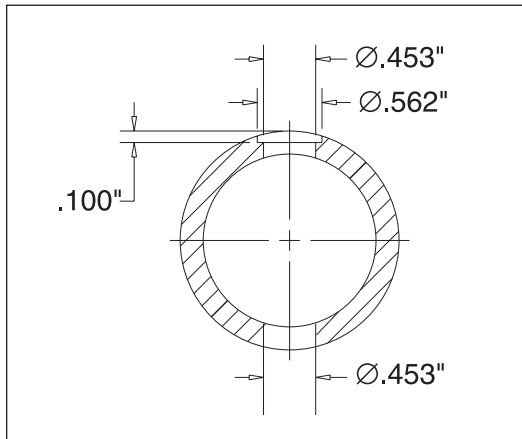
---

# BORING INSTRUCTIONS

## RECEIVER WITH PUSH-LOCK™ STUD

Used with minimum SC80 1-1/4" or larger round pipe or round steel tubing with comparable dimensions.

Cable Dia: 1/8" and 3/16"



Receiver with Push-Lock™ Stud used with round pipe or tubing.

# BORING AND SLOTTING INSTRUCTIONS For Intermediate Posts and Cable Braces

*If you will be using grommets, see "Boring and slotting where grommets are being used" section on the next page.*

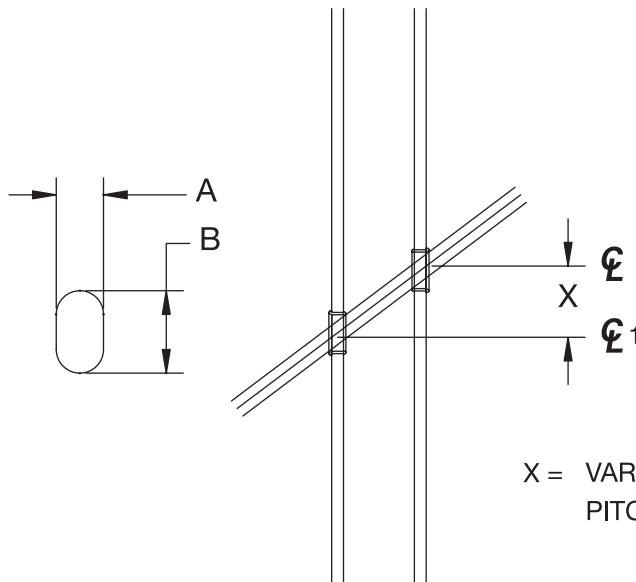
## Boring and slotting where grommets are NOT being used

### Intermediate Posts and Cable Braces Hole Diameters for LEVEL RUNS

HOLE DIAMETERS  
GROMMETS NOT BEING USED

Cable Dia.	Fittings FIELD Swaged	Fittings <b>FACTORY</b> Swaged	
		Using Threaded Stud	Using Swaging Ferrule
1/8"	.156"	.344"	.265"
3/16"	.219"		
1/4"	.281"	.469"	.390"
5/16"	.343"	.594"	.516"
3/8"	.406"		

### Intermediate Posts and Cable Braces Hole Diameters for STAIRS / SLOPED RUNS



Cable Dia.	A	B
1/8"	.156"	.362"
3/16"	.219"	.445"
1/4"	.281"	.524"
5/16"	.343"	.607"
3/8"	.406"	.690"

X = VARIES ACCORDING TO  
PITCH & FRAME ELEMENT

SLOTTING DIAGRAM FOR STAIRS/SLOPES  
AT PITCHES 0° THROUGH 37°

# BORING AND SLOTTING INSTRUCTIONS For Intermediate Posts and Cable Braces (continued)

## Boring and slotting where grommets ARE being used

### Intermediate Posts and Cable Braces Hole Diameters for LEVEL RUNS

HOLE DIAMETERS — GROMMETS **ARE** BEING USED

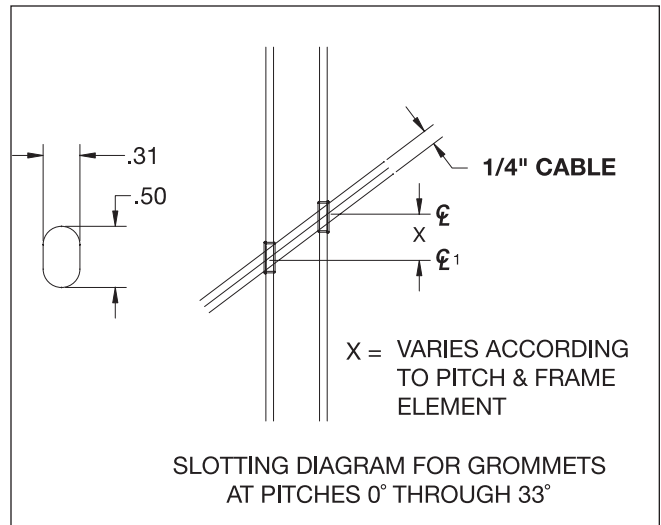
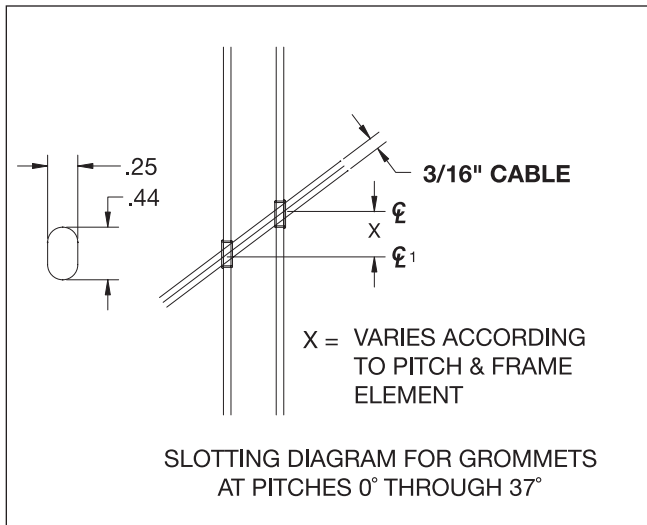
**Cable or Fitting Diameter passing through post**      Hole sizes are actual sizes *after* finish is applied (\*see note).

1/8"	.250"
3/16"	
1/4"	.312"

Grommets are not offered for diameters greater than 1/4".

*\*Note: Grommets will not install properly in under- or over-sized holes.*

### Intermediate Posts and Cable Braces Hole Diameters for STAIRS / SLOPED RUNS

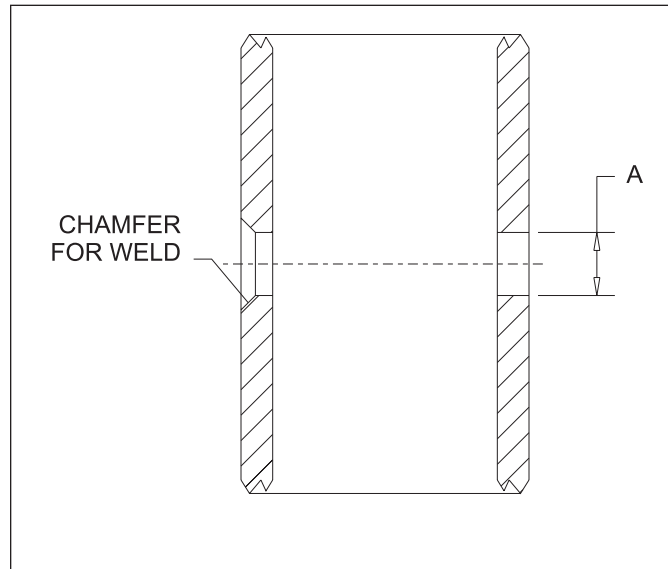


# TUBED CORNER SECTION BORING INSTRUCTIONS AND TUBING SPECIFICATIONS

Note that the inside of the tubing cannot be sealed to prevent moisture inside the tubes. Therefore, we recommend stainless steel tubing for all **exterior** tubed corner section applications, to prevent rust inside the tubing.

Cable Dia.	Tubing Dia.	Wall Thickness	Inside Dia.	A Drilled and Reamed Hole Dia.
1/8"	3/8"	.064"	.209"	.377"
3/16"		.065"	.245"	
1/4"		.042"	.293"	
5/16"	7/16"	.035"	.367"	.440"
3/8"	1/2"	.042"	.416"	.502"

**Boring diagram for post to accept tubes**

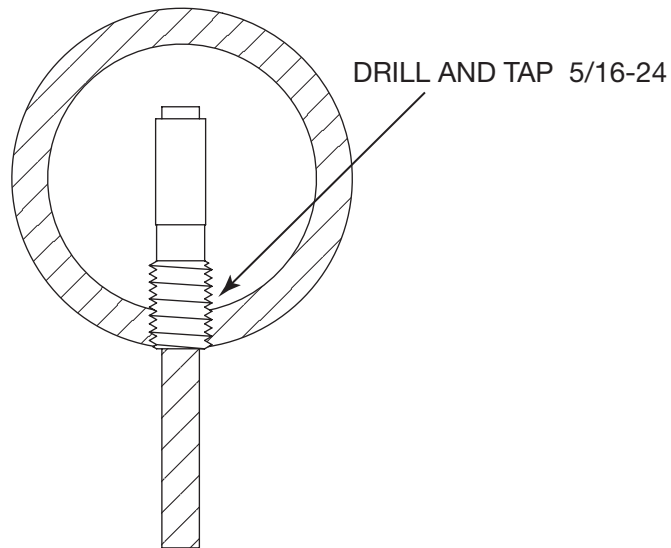


**Note: Factory can supply drilled posts, tubing, and top and bottom rail sections for tubed corner sections. Please call for pricing.**

# VERTICAL RAILING BORING DIAGRAMS

## Top Rail Holes

Top rail holes on the underside (only) of the top rail are drilled and tapped on 3.25" centers to accept Invisiware® 5/16-24 Threaded Studs for 1/8" or 3/16" diameter cable. (Note that every eighth cable is replaced with a rail brace, to keep the top and bottom rails from bending).



## Bottom Rail Holes

Bottom rail holes are drilled 3.25" centers to accept Invisiware® Receivers for 1/8" or 3/16" diameter cable. (Note that every eighth cable is replaced with a rail brace, to keep the top and bottom rails from bending).

