



# **HARDWARE MOUNTING HOLES BORING GUIDE FOR METAL RAILINGS**

## **TABLE OF CONTENTS**

<b>Boring Diagrams and Instructions</b>	<b>Page</b>
Adjust-A-Body® and Adjust-A-Jaw® Tensioners and Ultra-tec® Fixed Jaws .....	2
Invisiware® Clip-on Stops .....	3
Invisiware® Fixed 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 .....	14-16
Push-Lock™ Threaded Bolt .....	17
Receiver with Push-Lock™ Stud Fittings .....	18-19
Intermediate Posts and Cable Braces .....	20-21
Corner Section Tube Boring, including Tubing Specifications .....	22
Vertical Railings .....	23

# 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
A-JTB6	1/8"	5/16-24 2B
	3/16"	
A-JTB8	1/4"	

## 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
A-JTE6	1/8"	5/16" (.313")	3/8" (.375")
	3/16"		
A-JTE8	1/4"	7/16" (.438")	1/2" (.500")

## 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.

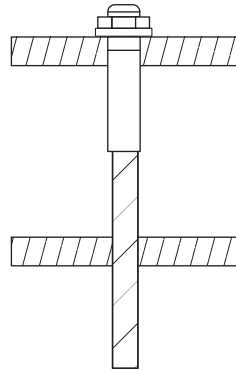
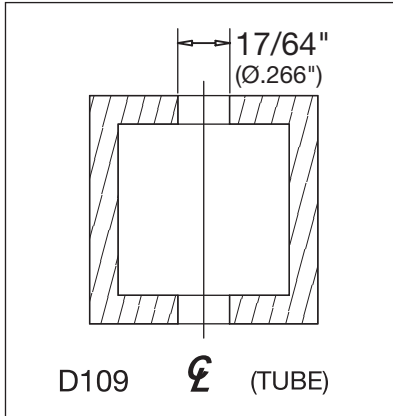
If part is being mounted to a structural tee, angle iron or steel plate, drill holes as indicated below:

Part No.	Used with Cable Dia.	Hole Dia.	Max Dimension from Front Edge of Mounting Surface to Hole Center	Jaw Opening
A-J62	1/8"	5/16" (.313")	3/8" (.375")	.260"
	3/16"			
A-J82	1/4"	7/16" (.438")	1/2" (.500")	.390"
A-J122	5/16"		9/16" (.563")	
		3/8"		

# BORING INSTRUCTIONS

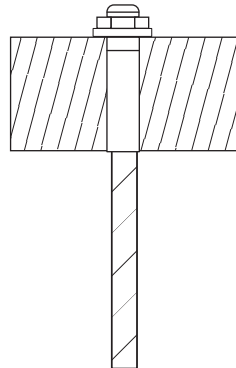
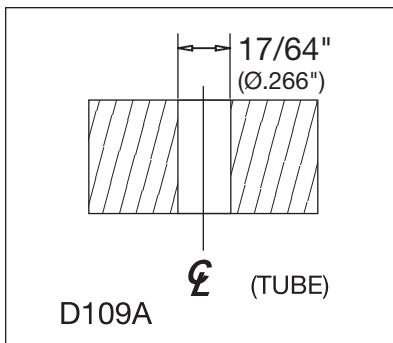
## INVISIWARE® CLIP-ON STOP

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



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

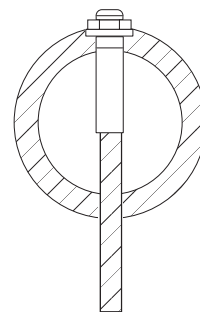
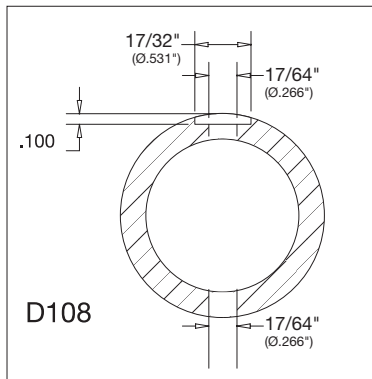
Used with flat bar.



Invisiware® 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.

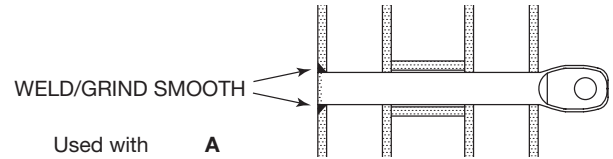
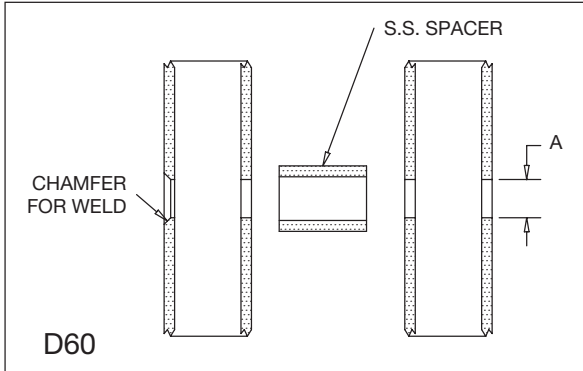


Invisiware® Clip-on Stop with round pipe or steel tubing.

# BORING INSTRUCTIONS

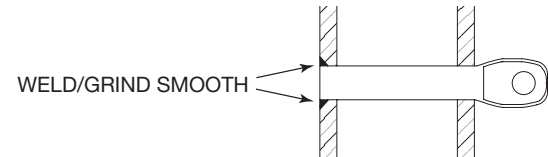
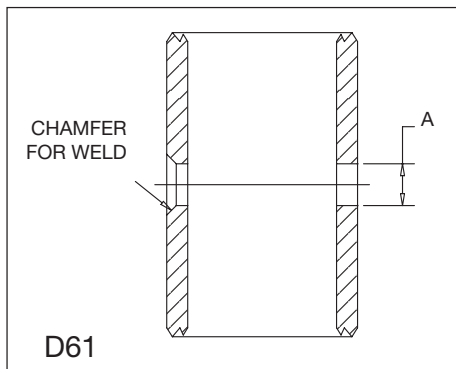
## INVISIWARE® FIXED TAB

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

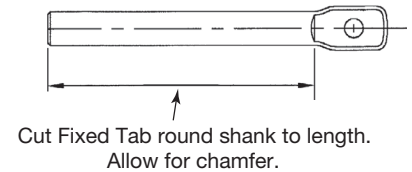


Part No.	Used with Cable Dia.	A Hole Dia.
F-T6-5A	1/8"	3/8" (.375")
F-T6-5B	3/16"	
F-T8-5A	1/4"	9/16" (.562")
F-T8-5B		

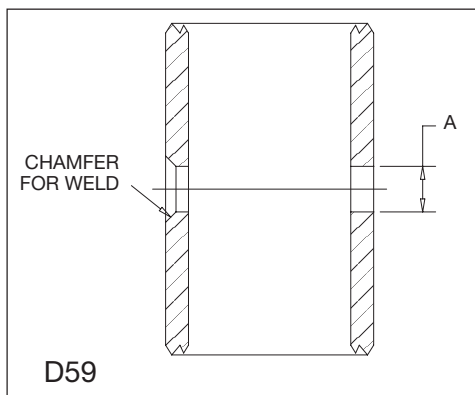
Used with square or rectangular tubing with minimum .250" wall thickness, or round steel tubing with wall thickness at least comparable to SC80 pipe.



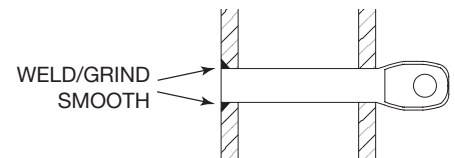
Part No.	Used with Cable Dia.	A Hole Dia.
F-T6-5A	1/8"	3/8" (.375")
F-T6-5B	3/16"	
F-T8-5A	1/4"	9/16" (.562")
F-T8-5B		



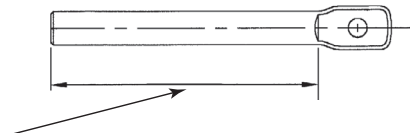
Used with minimum SC80 pipe.



Part No.	Used with Cable Dia.	A Hole Dia.
F-T6-5A	1/8"	3/8" (.375")
F-T6-5B	3/16"	
F-T8-5A	1/4"	9/16" (.562")
F-T8-5B		



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

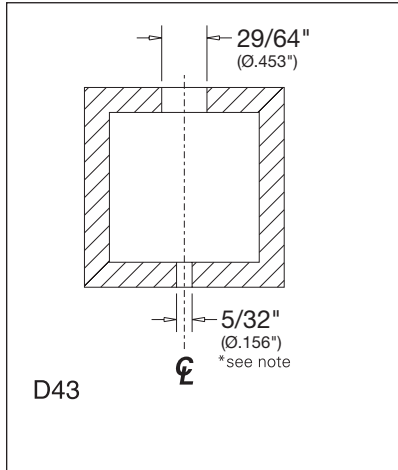
## INVISIWARE® RADIUS FERRULE

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

Part No. RF-4

Cable Dia: 1/8"

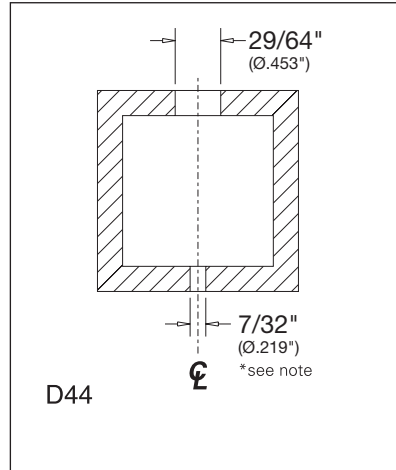
\*see note if using grommets



Part No. RF-6

Cable Dia: 3/16"

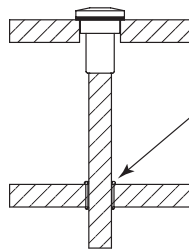
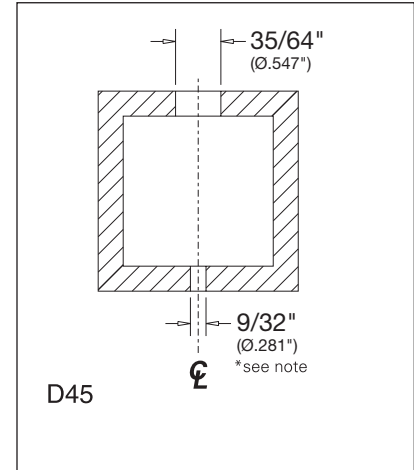
\*see note if using grommets



Part No. RF-8

Cable Dia: 1/4"

\*see note if using grommets

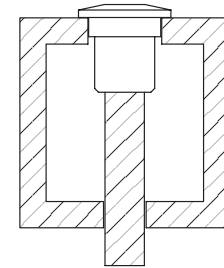


**\*Note:** If grommets are being used, hole through which cable passes should be drilled as follows:

RF-4: 1/4" (.250")

RF-6: 1/4" (.250")

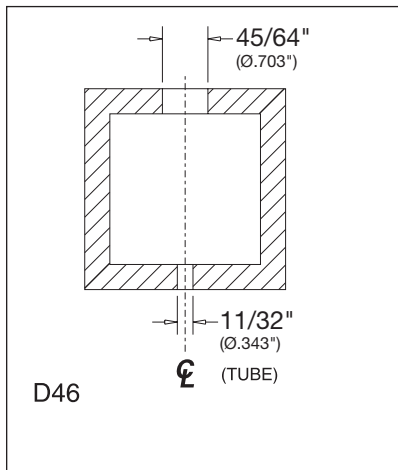
RF-8: 5/16" (.312")



(TUBE)

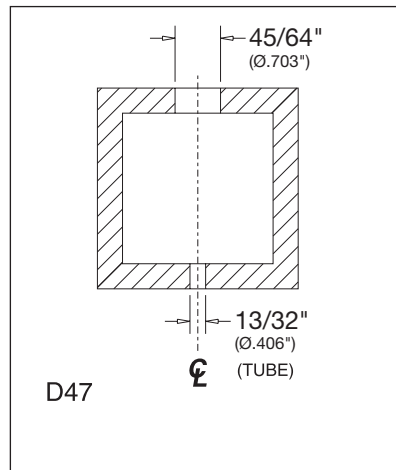
Part No. RF-10

Cable Dia: 5/16"



Part No. RF-12

Cable Dia: 3/8"



Invisiware® Radius Ferrule with square or rectangular tubing.

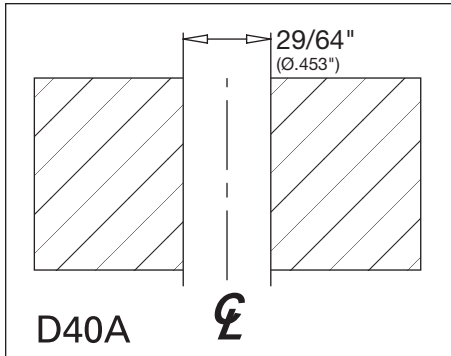
Grommets are not offered for use with RF-10 and RF-12 Radius Ferrules.

# BORING INSTRUCTIONS

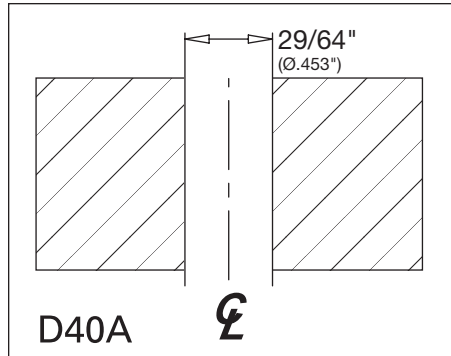
## INVISIWARE® RADIUS FERRULE

Used with flat bar or steel plate.

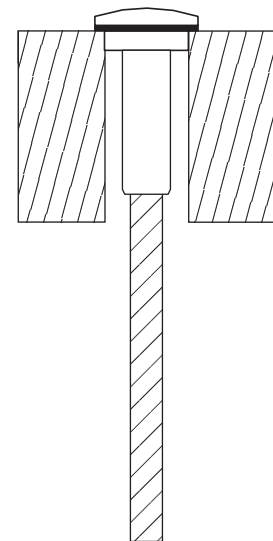
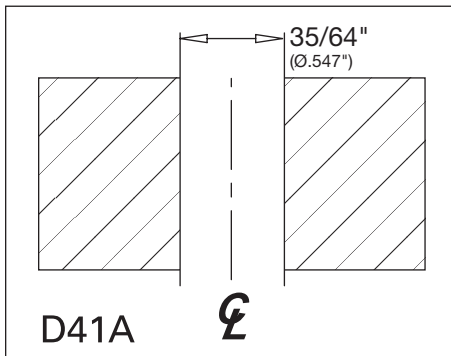
Part No. RF-4  
Cable Dia: 1/8"



Part No. RF-6  
Cable Dia: 3/16"

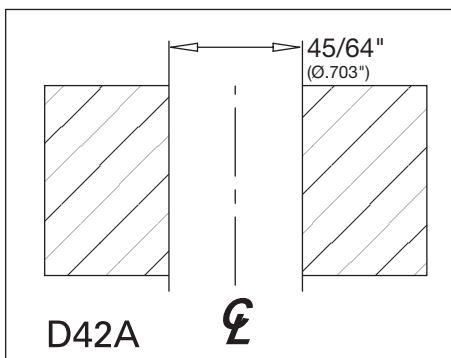


Part No. RF-8  
Cable Dia: 1/4"

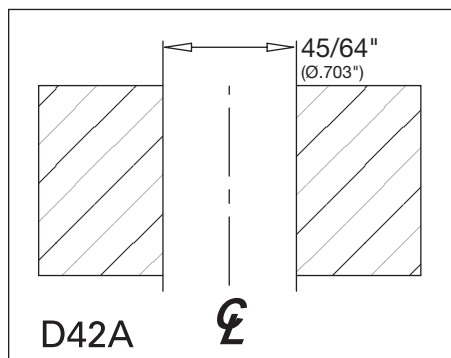


Invisiware® Radius Ferrule  
with flat bar or steel plate.

Part No. RF-10  
Cable Dia: 5/16"



Part No. RF-12  
Cable Dia: 3/8"



# BORING INSTRUCTIONS

## INVISIWARE® RADIUS FERRULE

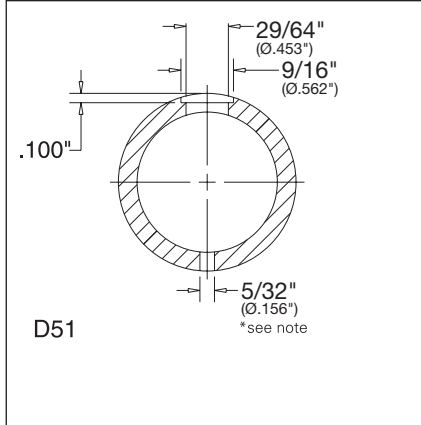
Used with minimum SC80 round pipe or round steel tubing.

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

**Part No. RF-4**

**Cable Dia: 1/8"**

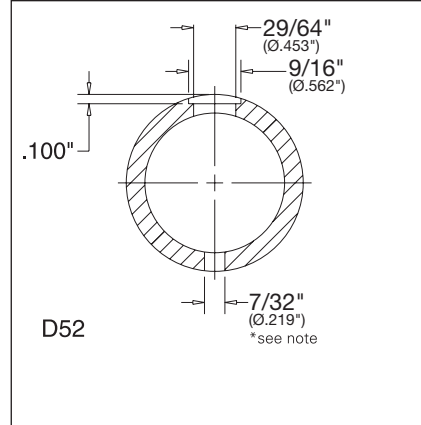
**\*see note if using grommets**



**Part No. RF-6**

**Cable Dia: 3/16"**

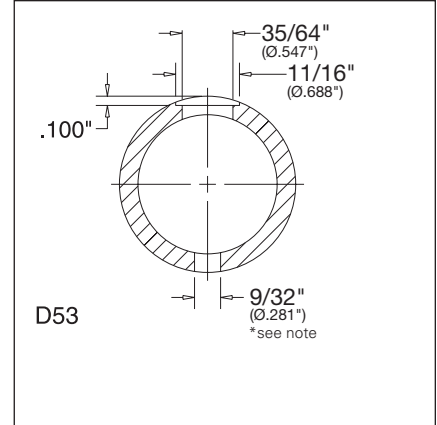
**\*see note if using grommets**



**Part No. RF-8**

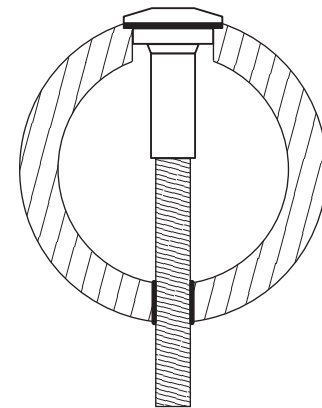
**Cable Dia: 1/4"**

**\*see note if using grommets**



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

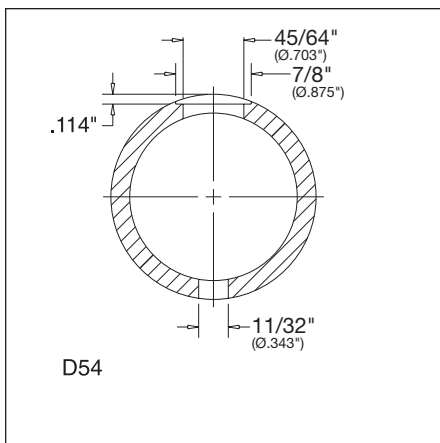
- RF-4: 1/4" (.250")**
- RF-6: 1/4" (.250")**
- RF-8: 5/16" (.312")**



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

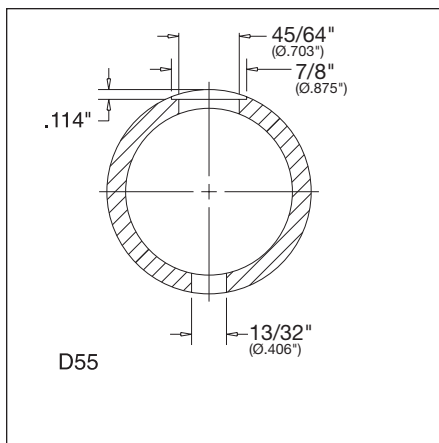
**Part No. RF-10**

**Cable Dia: 5/16"**



**Part No. RF-12**

**Cable Dia: 3/8"**



Grommets are not offered for use with RF-10 and RF-12 Radius Ferrules.

# BORING INSTRUCTIONS

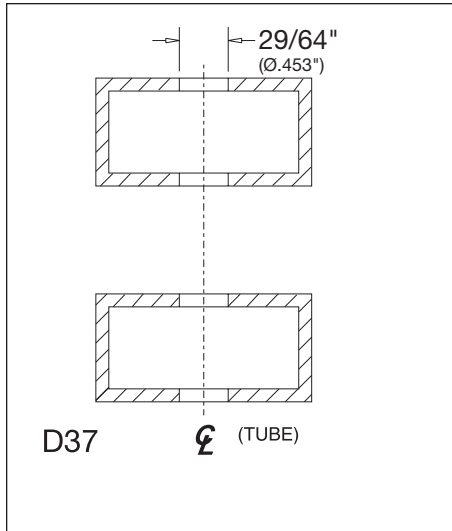
## INVISIWARE® RECEIVER

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

Part Nos.

R-6-12 through R-6-62

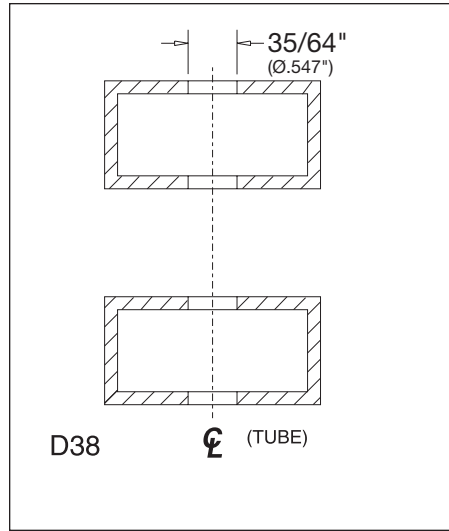
Cable Dia: 1/8" and 3/16"



Part Nos.

R-8-22 through R-8-52

Cable Dia: 1/4"

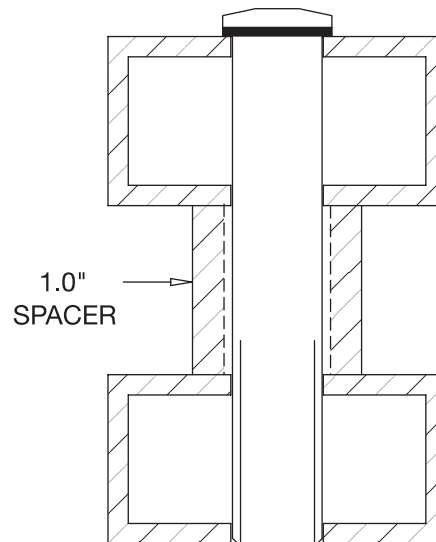
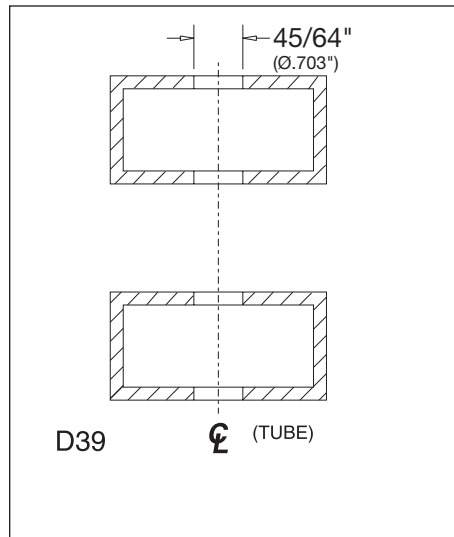


Part Nos.

R-12-32 through R-12-52

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

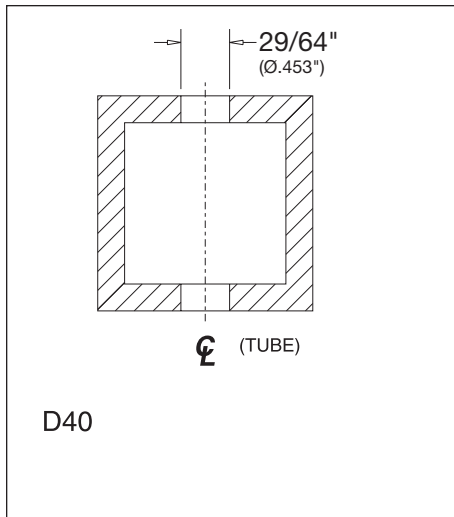
Used with square or rectangular tubing. We recommend a minimum 1/4" wall.

Part Nos.

R-6-12 through R-6-62

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

Drill 2 places

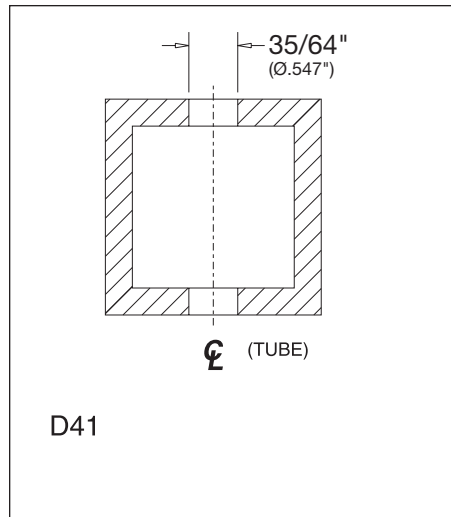


Part Nos.

R-8-22 through R-8-52

Cable Dia: 1/4"

Drill 2 places

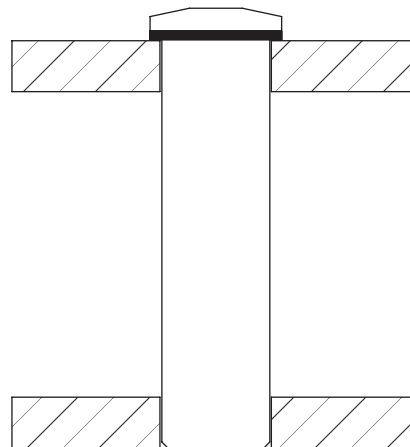
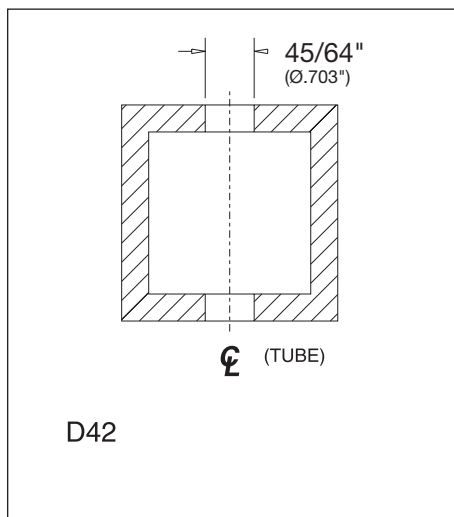


Part Nos.

R-12-32 through R-12-52

Cable Dia: 5/16" and 3/8"

Drill 2 places



Invisiware® Receiver used square or rectangular tubing.

# BORING INSTRUCTIONS

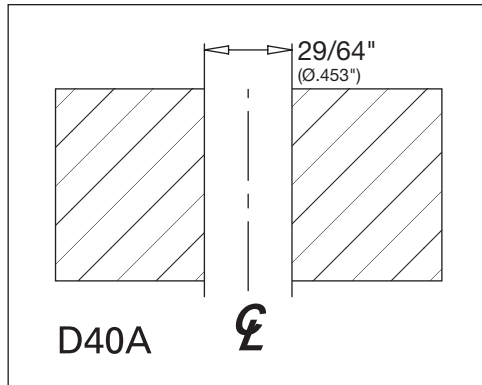
## INVISIWARE® RECEIVER

Used with flat bar or steel plate.

Part Nos.

R-6-12 through R-6-62

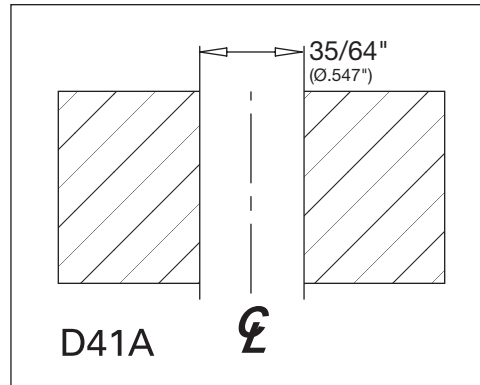
Cable Dia: 1/8" and 3/16"



Part Nos.

R-8-22 through R-8-52

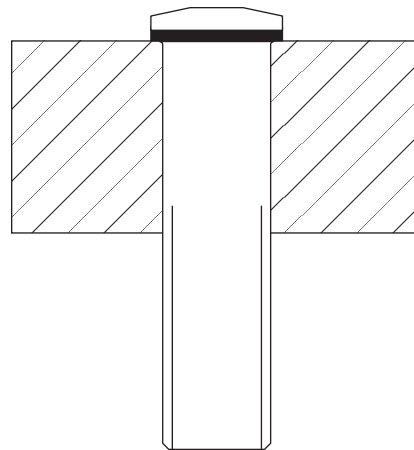
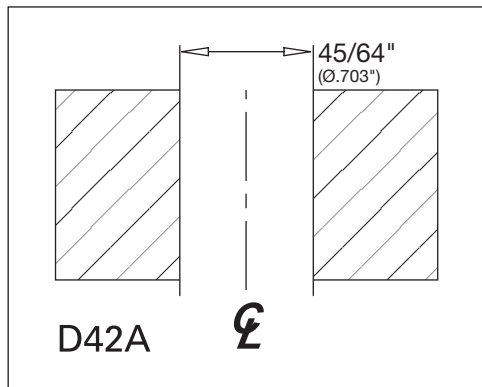
Cable Dia: 1/4"



Part Nos.

R-12-32 through R-12-52

Cable Dia: 5/16" and 3/8"



Invisiware® Receiver used with flat bar or steel plate.

# BORING INSTRUCTIONS

## INVISIWARE® RECEIVER

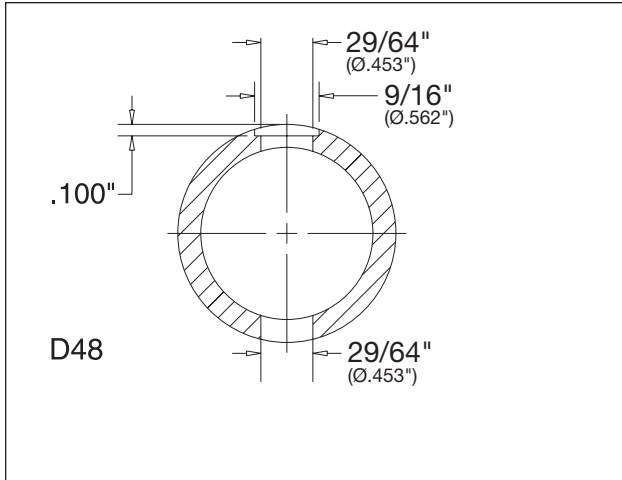
Used with minimum SC80 round pipe or round steel tubing.

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

### Part Nos.

R-6-12 through R-6-62

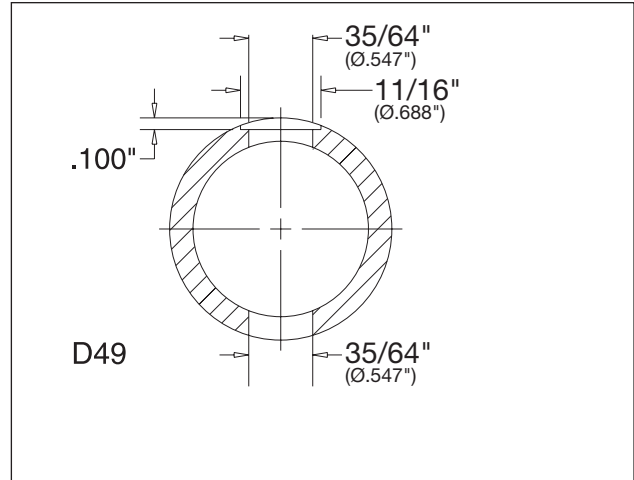
Cable Dia: 1/8" and 3/16"



### Part Nos.

R-8-22 through R-8-52

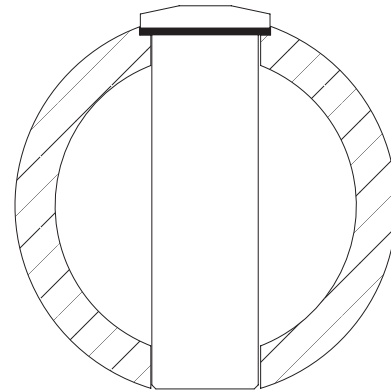
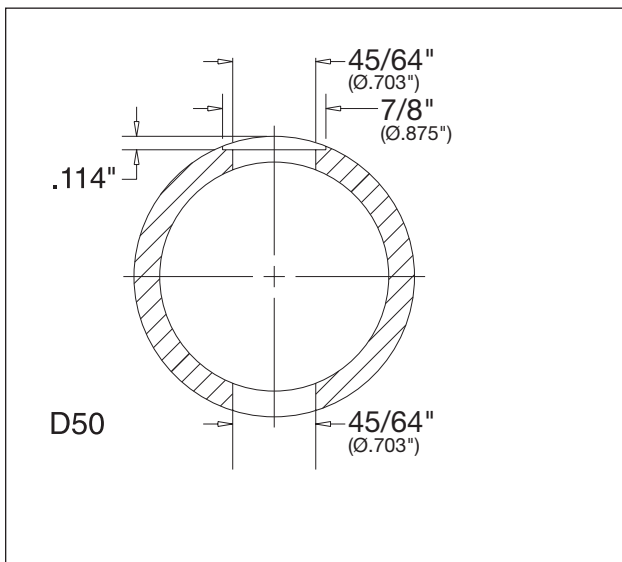
Cable Dia: 1/4"



### Part Nos.

R-12-32 through R-12-52

Cable Dia: 5/16" and 3/8"



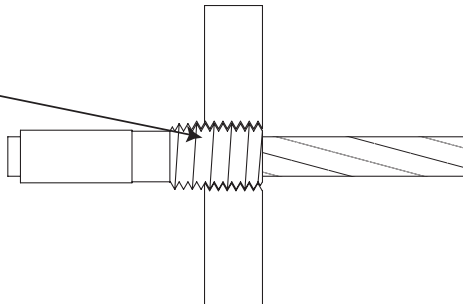
Invisiware® Receiver used with pipe.

# 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
S-4	1/8"	5/16 - 24 UNF CL 2-B RH
S-6	3/16"	
S-8	1/4"	7/16 - 20 UNF CL 2-B RH
S-10	5/16"	9/16 - 18 UNF CL 2-B RH
S-12	3/8"	



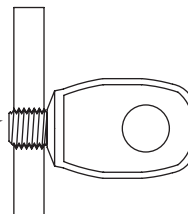
**Construction Material** \*Note: Recommended minimum wall thicknesses:

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>

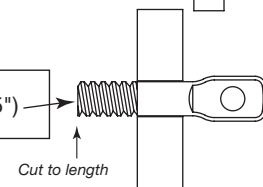
## INVISIWARE® THREADED TAB

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

Part No.	Cable Dia.	Drill and Tap Hole
TT-6B	1/8"	5/16 - 24 UNF CL 2-B RH
	3/16"	
TT-8B	1/4"	
	3/8"	



Part No.	Cable Dia.	Drill Hole
TT-6B-L	1/8"	7/16" (.4375")
	3/16"	



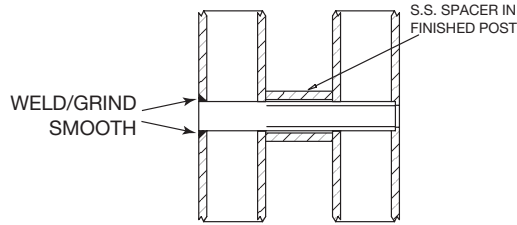
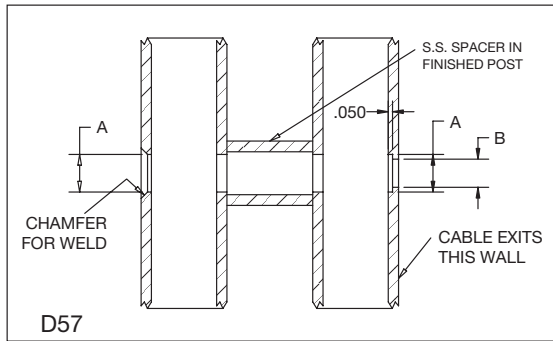
**Construction Material** \*Note: Recommended minimum wall thicknesses:

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.

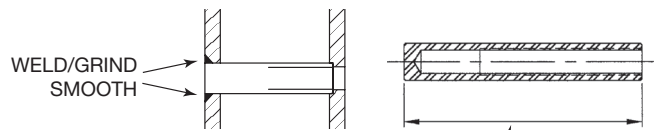
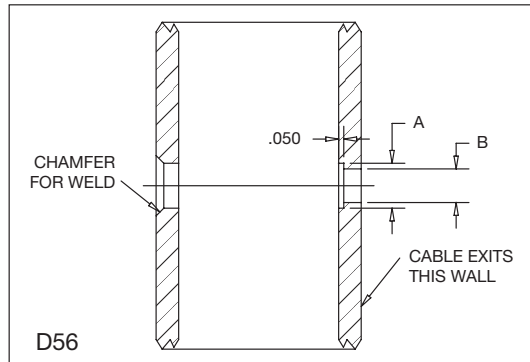


Part No.	Used with Cable Dia.	Hole Diameters	
		A	B
WR-6-5A	1/8"	7/16" (.437")	21/64" (.328")
WR-6-5B	3/16"		
WR-8-5A	1/4"	17/32" (.531")	29/64" (.453")
WR-8-5B			

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.

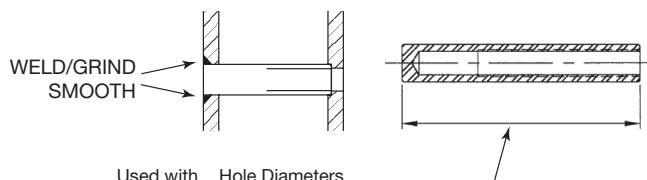
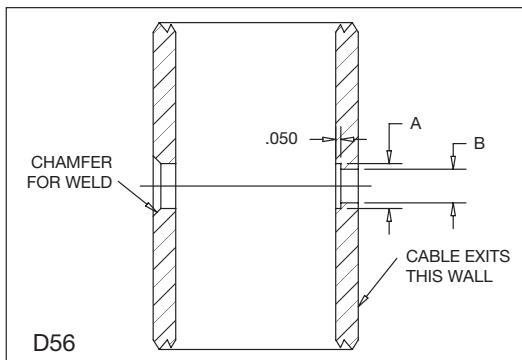
If using round steel tubing, wall thickness must be at least comparable to SC80 pipe.



Part No.	Used with Cable Dia.	Hole Diameters	
		A	B
WR-6-5A	1/8"	7/16" (.437")	21/64" (.328")
WR-6-5B	3/16"		
WR-8-5A	1/4"	17/32" (.531")	29/64" (.453")
WR-8-5B			

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
WR-6-5A	1/8"	7/16" (.437")	21/64" (.328")
WR-6-5B	3/16"		
WR-8-5A	1/4"	17/32" (.531")	29/64" (.453")
WR-8-5B			

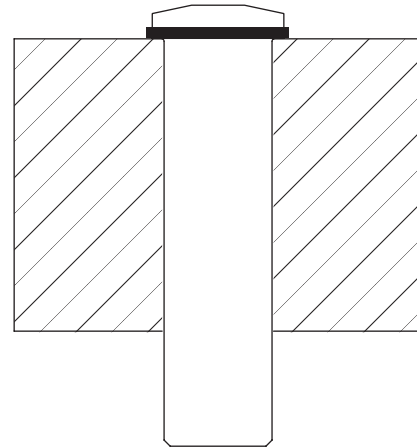
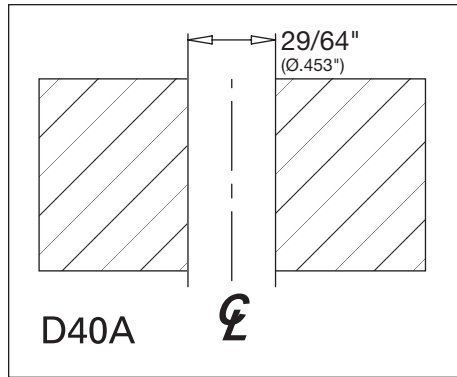
Cut Welded Receiver to length as follows:  
 1-1/4" std. Sc 80 Pipe: 1.44"  
 1-1/2" std. Sc 80 Pipe: 1.675"  
 2" std. Sc 80 Pipe: 2.137"

# BORING INSTRUCTIONS

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

Used with flat bar or steel plate.

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

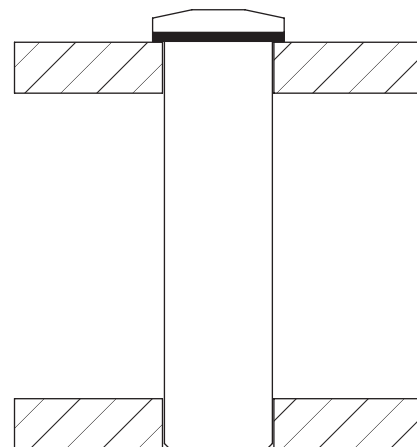
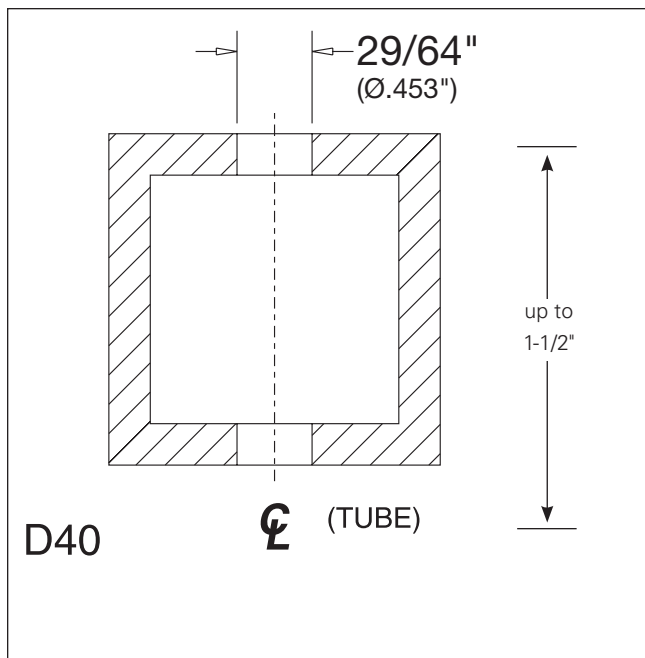


Push-Lock™ or Pull-Lock™ fitting used with flat bar or steel plate.

## 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"



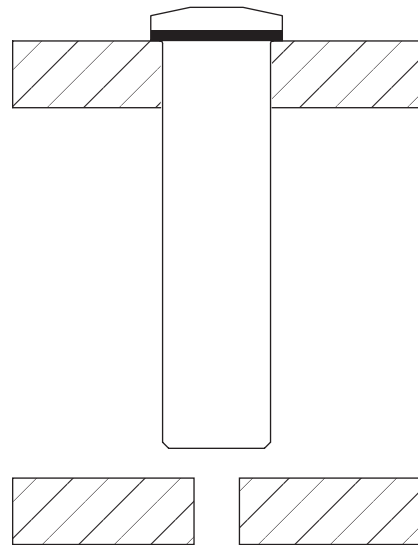
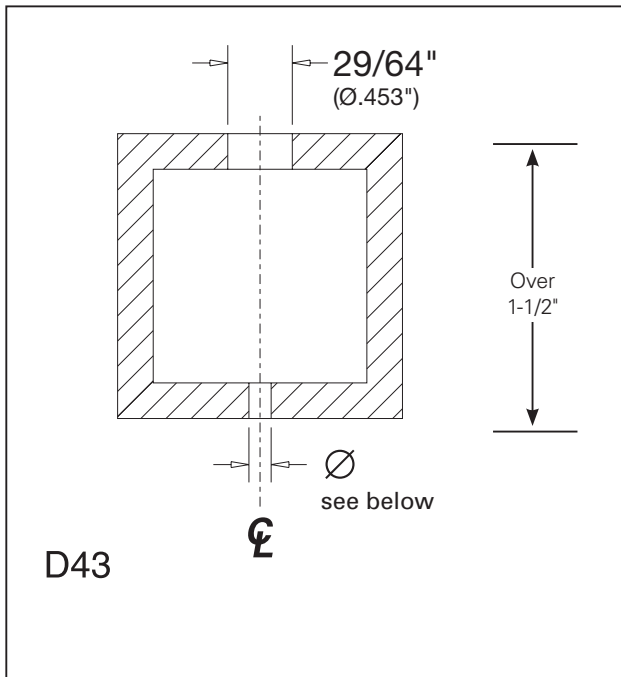
Push-Lock™ or Pull-Lock™ fitting used with square or rectangular tubing.

# 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" and 3/16"



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

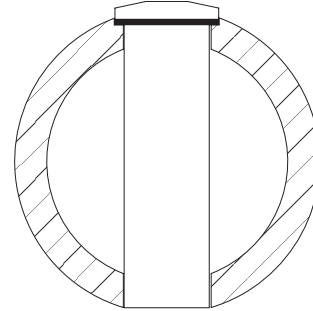
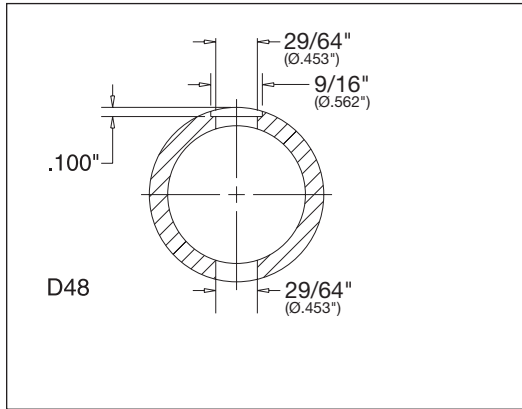
Cable Diameter	Hole Diameter
1/8"	5/32" (.156")
3/16"	7/32" (.218")
with grommet installed	1/4" (.250")

# 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"

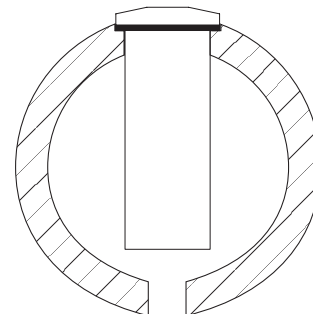
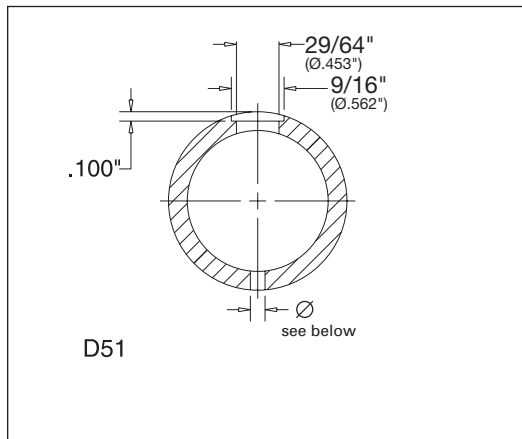


Push-Lock™ or Pull-Lock™ fitting used with round pipe or tubing.

## 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" and 3/16"



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

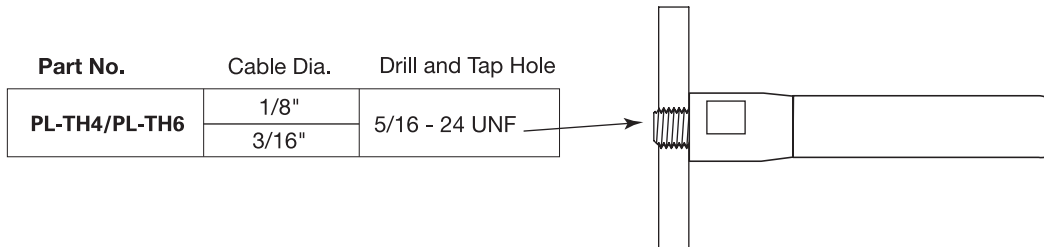
Cable Diameter	Hole Diameter
1/8"	5/32" (.156")
3/16"	7/32" (.218")
with grommet installed	1/4" (.250")



# BORING INSTRUCTIONS

## PUSH-LOCK™ THREADED BOLT

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



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

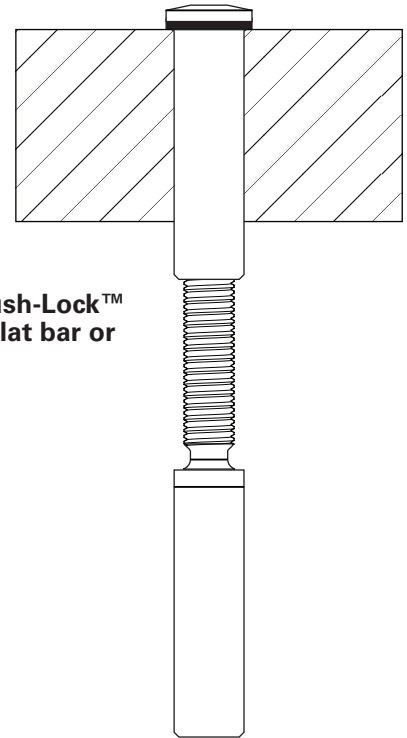
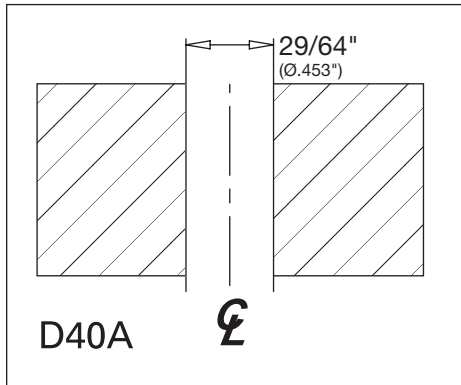
<b>Pipe</b>	Minimum Schedule 80
<b>Round Steel Tubing</b>	At least equivalent to Schedule 80 Pipe
<b>Square or Rectangular Structural Steel Tubing</b>	.250"

# BORING INSTRUCTIONS

## RECEIVER WITH PUSH-LOCK™ STUD FITTINGS

Used with flat bar or steel plate.

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

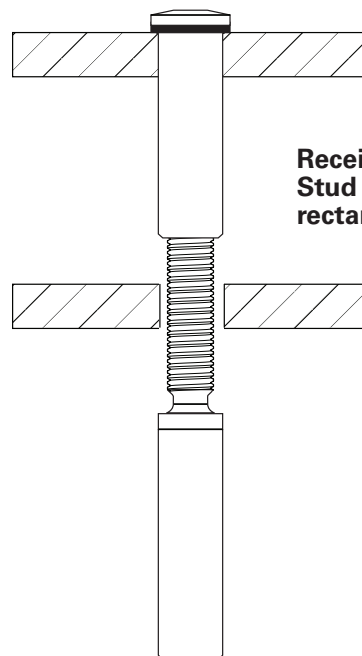
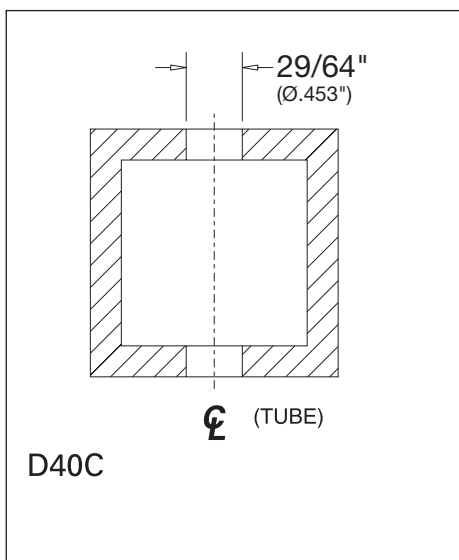


Receiver with Push-Lock™ Stud used with flat bar or steel plate.

## RECEIVER WITH PUSH-LOCK™ STUD FITTINGS

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

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



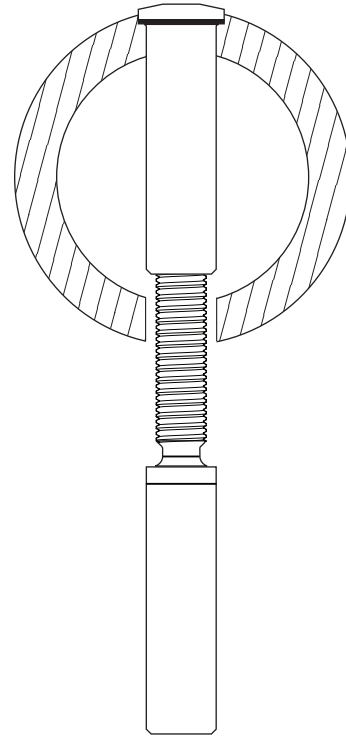
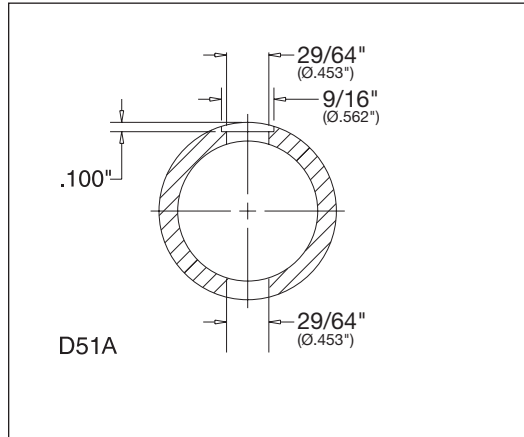
Receiver with Push-Lock™ Stud used with square or rectangular tubing.

# BORING INSTRUCTIONS

## RECEIVER WITH PUSH-LOCK™ STUD FITTINGS

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.*

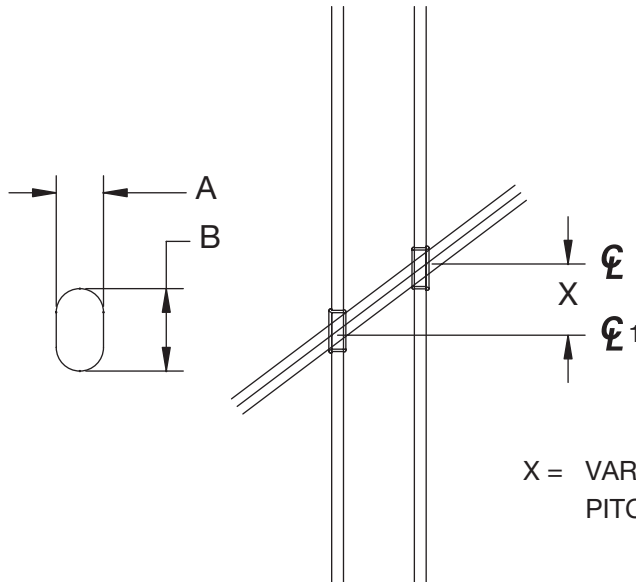
### Boring and slotting where grommets are NOT being used

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

HOLE DIAMETERS  
GROMMETS **NOT** BEING USED

Cable Dia.	Fittings FIELD Swaged	Fittings FACTORY Swaged	
		Using Threaded Stud	Using Swaging Ferrule
1/8"	5/32" (.156")	11/32" (.344")	17/64" (.265")
3/16"	7/32" (.219")		
1/4"	9/32" (.281")	15/32" (.469")	25/64" (.390")
5/16"	11/32" (.343")	19/32" (.594")	33/64" (.516")
3/8"	13/32" (.406")		

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



Cable Dia.	A	B
1/8"	5/32" (.156")	23/64" (.362")
3/16"	7/32" (.219")	29/64" (.445")
1/4"	9/32" (.281")	17/32" (.524")
5/16"	11/32" (.343")	29/64" (.607")
3/8"	13/32" (.406")	11/16" (.690")

X = VARIES ACCORDING TO  
PITCH & FRAME ELEMENT

D101A

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

# BORING AND SLOTING 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

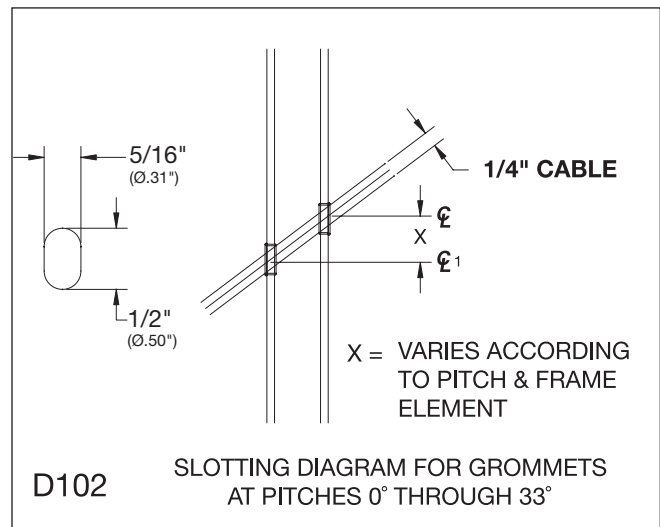
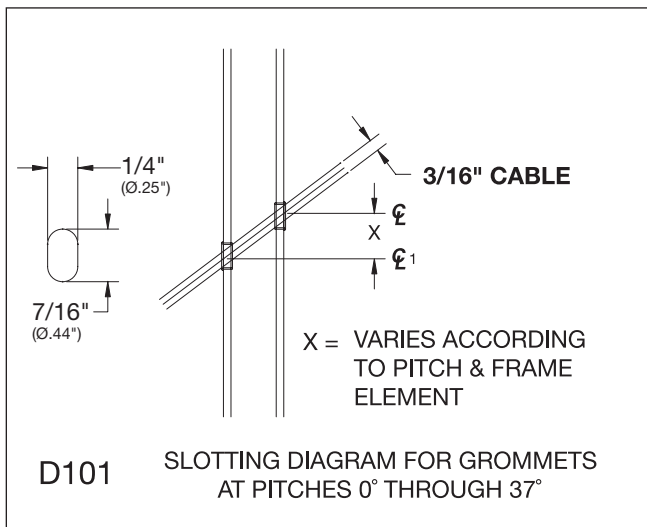
**Cable or Fitting Diameter passing through post**      Hole sizes are actual sizes *after* finish is applied (\*see note).

1/8"	1/4" (.250")
3/16"	
1/4"	5/16" (.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

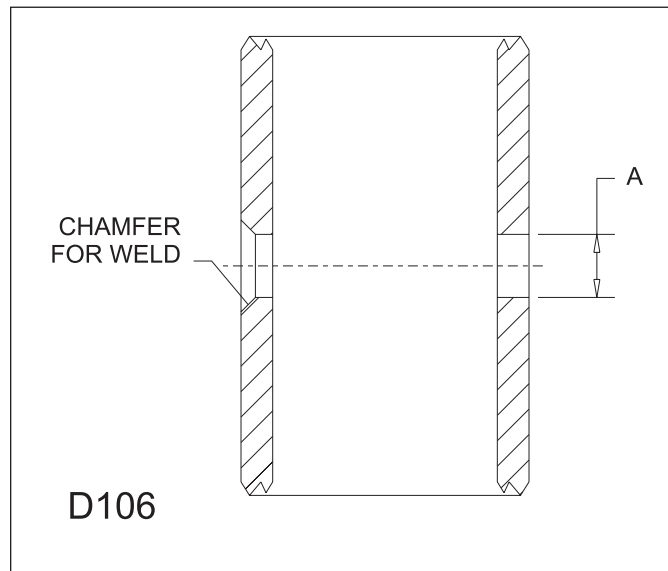


# CORNER SECTION TUBE BORING INSTRUCTIONS AND TUBING SPECIFICATIONS

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"	25/64" (.377")
3/16"		.065"	.245"	
1/4"		.049"	.277"	
5/16"	7/16"	.035"	.367"	7/16" (.440")
3/8"	1/2"	.042"	.416"	1/2" (.502")

**Boring diagram for post to accept tubes**

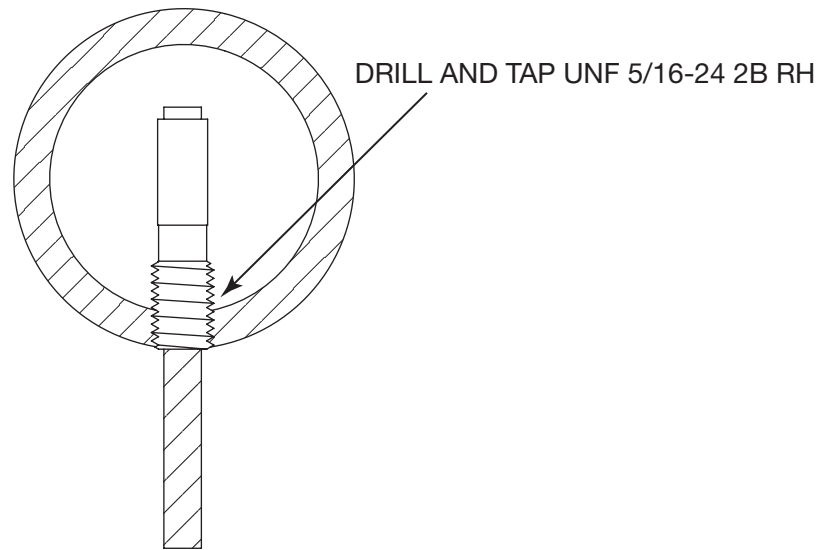


**Note: Factory can supply drilled posts, tubing, and top and bottom rail sections for tubed corner sections. Please call for pricing.**

# 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).

