Building connections that last™

ASC Engineered Solutions

Handbook
Pipe Fitters

For the most current product / pricing information on ASC Engineered Solutions, please visit our website at asc-es.com.

Anvil and Smith-Cooper are now ASC Engineered Solutions™

In 2019, Anvil International merged with Smith-Cooper International. The result was a complementary pair of industry leaders working side by side to provide precision-engineered pipes, valves, fittings and supports, along with related services.

For over 150 years, we have worked to build a strong, vibrant tradition of making connections - pipe to pipe and people to people. We've always been dedicated to building connections that last. As ASC Engineered Solutions, we are ready to make those connections stronger than ever by focusing as much on how we serve our customers as on the products we provide. This is what makes ASC stand out.

We're in the solutions business. That means we go beyond a product portfolio of unmatched quality and breadth. A solution involved much more than products: it takes expertise, reliable availability and dependable partnership. Providing engineered solutions means solving customer challenges - and that's why we exist.

One company.
One focus.
Your success.

GRUVLOK
An ASC Engineered Solution

ASC Engineered Solutions

Table of Contents

Gruvlok® Installation and Assembly

Gruvlok® Technical Data

ASC Engineered Solutions

Table of Contents

ASC Engineered Solutions

Table of Contents

GRUVLOK
An ASC Engineered Solution

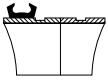
Fig. 7000 Flexible Coupling
Fig. 7001 Lightweight Flexible Couping

1 Check & Lubricate Gasket

Check gasket to be sure it is compatible for the intended service. Apply a thin coating of Gruvlok lubricant to the exterior surface and sealing lips of the gasket. Be careful that foreign particles do not adhere to lubricated surfaces.

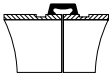
2 Gasket Installation

Slip the gasket over the pipe end, making sure the gasket lip does not overhang the pipe end.



3 Alignment

After aligning the two pipe ends together, pull the gasket into position, centering it between the grooves on each pipe. Gasket should not extend into the groove on either pipe.



4 Housings

With one nut unthreaded to the end of the bolt, unthread the other nut completely and swing the coupling housing halves over the gasket, making sure the housing keys engage the grooves. Insert the bolt and turn the nuts finger tight.

5 Tighten Nuts

Tighten the nuts alternately and equally to the specified bolt torque. The housing bolt pads must make metal-to-metal contact.

CAUTION: Uneven tightening may cause the gasket to pinch.

6 Assembly is Complete

Visually inspect the pipe joint to assure the coupling keys are fully engaged in the pipe grooves and the bolt pads are in firm even metal-to-metal contact on both sides of the coupling.

CAUTION: Proper torquing of coupling bolts is required to obtain specified performance. Over torquing the bolts may result in damage to the bolt and / or casting which could result in pipe joint separation. Under torquing the bolts may result in lower pressure retention capabilities, lower bend load capabilities, joint leakage and pipe joint separation. Pipe joint separation may result in significant property damage and serious injury.

Note: The housings for sizes 16" and larger are cast in four or more segments.

To Install: Loosely pre-assemble the segments into two "Housing Halves" making sure that the alignment tang(s) and slot(s) on the bolt pad(s) are properly mated. Install the "Housing Halves" as shown in steps 4 & 5. The coupling is properly installed when all bolt pads are firmly together - Metal-to-Metal.

Fig. 7400 Rigidlite® Coupling
Fig. 7401 RigidLOK® Coupling

WARNING

Read and understand all instructions before use. Ensure system is drained and depressurized before installation or service. Use appropriate personal protective equipment.

Failure to follow these instructions could result in serious personal injury and/or property damage.

Check pipe ends for proper grooved dimensions and to ensure that the pipe is free of indentations, projections, or other imperfections that would prevent proper sealing of the gasket.

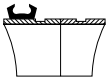
1 Check & Lubricate Gasket

Check gasket to be sure it is compatible for the intended service. Apply a thin coating of Gruvlok lubricant to outside and sealing lips of the gasket. Some applications require lubrication of the entire gasket surface. Be careful that foreign particles do not adhere to lubricated surfaces.

Notice: Gruvlok Xtreme Lubricant must be applied when used in dry pipe systems or freezer applications. separation. Pipe joint separation may result in significant property damage and serious injury.

2 Gasket Installation

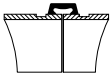
Slip the gasket over the pipe end making sure the gasket lip does not overhang the pipe end.



On couplings 10" and larger it may be easier to turn the gasket inside out then lubricate and slide the gasket over the pipe end as shown.

3 Alignment

After aligning the two pipe ends, pull the gasket into position centering it between the grooves on each pipe. Gasket should not extend into the groove on either pipe. On couplings 10" and larger, flip or roll the gasket into centered position.



4 Housings

Remove one nut and bolt and loosen the other nut. Place one housing over the gasket, making sure the housing keys fit into the pipe grooves. Swing the other housing over the gasket and into the grooves on both pipes, making sure the tongue and recess of each housing is properly mated. Reinsert the bolt and run-up both nuts finger tight.

Fig. 7400 Rigidlite® Coupling (Continued)
Fig. 7401 RigidLOK® Coupling (Continued)

WARNING

Read and understand all instructions before use. Ensure system is drained and depressurized before installation or service. Use appropriate personal protective equipment.

Failure to follow these instructions could result in serious personal injury and/or property damage.

5 Tighten Nuts

Securely tighten nuts alternately and equally, keeping the gaps at the bolt pads evenly spaced.

Notice: Uneven tightening may cause the gasket to pinch. Gasket should not be visible between segments after bolts are tightened.

6 Assembly is Complete

Visually inspect the pipe joint to assure the coupling keys are fully engaged in the pipe grooves. The bolt pads are to have equal gaps on each side of the coupling.

Notice: Visually inspect both sides of the coupling to ensure gaps between bolt pads are evenly spaced and are parallel. Any deviations must be corrected before placing coupling into service.

Notice: Sizes 16" and larger are cast in multiple segments. To install the larger sizes align the tongue and pocket of the couplings appropriately and tighten the nuts alternately to the specified bolt torque. When properly assembled there will be a small equal gap between the adjacent bolt pads.

ANSI Specified Bolt Torque

Bolt Size	Wrench Size	Specified Bolt Torque*
In.	In.	Ft.-Lbs
3/8	11/16	30–45
1/2	7/8	80–100

*Non-lubricated bolt torques.

ANSI Specified Bolt Torque

Bolt Size	Wrench Size	Specified Bolt Torque*
In.	In.	Ft.-Lbs
3/8	11/16	30–45
1/2	7/8	80–100
5/8	1 1/16	100–130
3/4	1 1/4	130–180
1	1 5/8	200–250

*Non-lubricated bolt torques.

GRUVLOK
An ASC Engineered Solution

Fig. 7001–2 Flexible Coupling
Fig. 7401–2 Gruvlok Rigidlok Coupling

WARNING

Read and understand all instructions before use. Ensure system is drained and depressurized before installation or service. Use appropriate personal protective equipment.

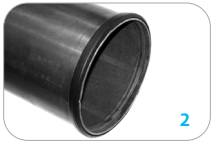
Failure to follow these instructions could result in serious personal injury and/or property damage.

CAUTION:
Proper torquing of coupling bolts is required to obtain specified performance. Over torquing the bolts may result in damage to the bolt and / or casting which could result in pipe joint separation. Under torquing the bolts may result in lower pressure retention capabilities, lower bend load capabilities, joint leakage and pipe joint separation. Pipe joint separation may result in significant property damage and serious injury.

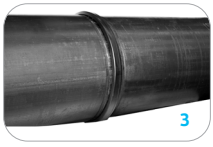
1 Pipe Preparation
Check Pipe ends for proper grooved dimensions and to ensure that the pipe is free of indentations, projections, or other imperfections that would prevent proper sealing of the gasket.

- 7401–2 bolts must be lightly coated with Gruvlok Xtreme lube before installation. See chart for torque requirements.
- Minimum wall pipe suitable for 14" – 24": 7401–2 roll grooved installation is 0.250" wall thickness.
- Pipe preparation grooved dimensions must conform to the Gruvlok Roll/Cut groove specification.

1a Check & Lubricate Gasket
Check gasket to be sure it is compatible for the intended service. Apply a thin coat of Gruvlok lubricant to the exterior surface and sealing lips of the gasket. Be careful that foreign particles do not adhere to lubricated surfaces.



2 Gasket Installation
Slip the gasket over the pipe end, making sure the gasket lip does not overhang the pipe end.



3 Alignment
After aligning the two pipe ends together, pull the gasket into position, centering it between the grooves on each pipe. Gasket should not extend into the groove on either pipe.

4 Housing
Place each housing half on the pipe and into each groove making sure that the gasket does not slip out of position in between the pipe ends or groove.

Fig. 7001–2 Flexible Coupling (Continued)
Fig. 7401–2 Gruvlok Rigidlok Coupling (Continued)

WARNING

Read and understand all instructions before use. Ensure system is drained and depressurized before installation or service. Use appropriate personal protective equipment.

Failure to follow these instructions could result in serious personal injury and/or property damage.

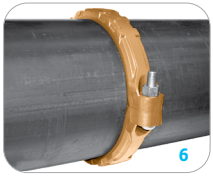
5 Bolts

Apply a thin coat of Xtreme lube to the bolt threads. Tighten the nuts alternately and equally to the specified bolt torque.

NOTICE: Uneven tightening may cause the gasket to pinch. Gasket should not be visible between segments after bolts are tightened.

6 Final Assembly

Visually inspect the pipe joint to assure the coupling keys are fully engaged in the pipe grooves, the bolt pads are in firm even metal-to-metal contact on both sides of the coupling, and gasket is not visible.



ANSI Specified Bolt Torque

Pipe Size	Bolt Size	Specified Bolt Torque	Lubrication
In.	In.	Ft.-Lbs	
14	⅞	180–220	Gruvlok Xtreme Lubricant
16	1	250–300	
18	1	250–300	
20	1⅛	375–425	
24	1⅛	375–425	

Notes:

GRUVLOK
An ASC Engineered Solution

Fig. 7011 Standard Coupling

CAUTION:
Proper torquing of coupling bolts is required to obtain specified performance. Over torquing the bolts may result in damage to the bolt and / or casting which could result in pipe joint separation. Under torquing the bolts may result in lower pressure retention capabilities, lower bend load capabilities, joint leakage and pipe joint separation. Pipe joint separation may result in significant property damage and serious injury.

1 Pipe Preparation
Inspect the pipe ends making sure the criteria, in the Gruvlok Large Diameter Pipe Roll and Cut Groove Specifications, are met.

2 Gasket Installation
Turn the gasket inside out and slide the gasket completely over one of the pipe ends. Turning the gasket inside out will reduce the stretching necessary to put the gasket into position. Ideally, approximately 75% of the pipe's gasket-sealing surface, (Dimension A) should be visible when the gasket is in proper position. This will aid in step

3 Lubricate Gasket
Lubricate the gasket sealing lips. The use of Gruvlok lubricants ensures compatibility between the lubricant and the gasket.

4 Alignment
Pull the two pipes into contact aligning the pipe ends.
CAUTION: Be careful not to pinch fingers during this step. Working your way around the circumference of the pipe, flip the gasket toward the pipe end so that the proper side is facing out. The end of this procedure will result in the gasket snapping into place. Position the gasket centrally between the grooves of the two pipe ends.

5 Lubricate Gasket
Lubricate the exterior surface of the gasket. This helps prevent pinching of the gasket during assembly.

Fig. 7011 Standard Coupling (Continued)

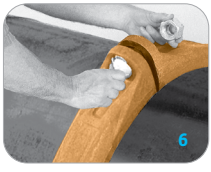
WARNING

Read and understand all instructions before use. Ensure system is drained and depressurized before installation or service. Use appropriate personal protective equipment.

Failure to follow these instructions could result in serious personal injury and/or property damage.

6 Housings

Secure the housings about the pipes making sure the coupling keys are engaged in the pipe end grooves. Hint: For horizontal assembly, place housing segment on top of the pipe to support the weight of the housing segment. Secure the adjacent housing with an oval neck track bolt and heavy hex nut and then rotate the secured housings, again balancing the weight of the housings on the top of the pipe. Continue this procedure for all segments.



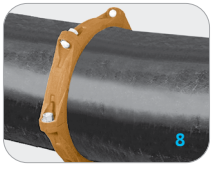
7 Tighten Nuts

Firmly torque each bolt. The specified minimum torque for each nut is 600 ft.-lbs. The specified maximum torque for each nut is 800 ft.-lbs.

8 Assembly is Complete

Installation of the Figure 7011 Standard Coupling is completed.

CAUTION: Proper torquing of coupling bolts is required to obtain specified performance. Over torquing the bolts may result in damage to the bolt and / or casting which could result in pipe joint separation. Under torquing the bolts may result in lower pressure retention capabilities, lower bend load capabilities, joint leakage and pipe joint separation. Pipe joint separation may result in significant property damage and serious injury.



Notes:

GRUVLOK
An ASC Engineered Solution

ASC Engineered Solutions

Fig. 74 SlideLOK® Ready for Installation Coupling Installation

Ready for Installation – Right Out of the Box

Do not disassemble the SlideLOK Coupling. The Figure 74 coupling is ready for installation. The bolt and gasket do not need to be removed.

1 Pipe Preparation

Pipe ends are to be rolled or cut grooved according to ASC Engineered Solutions™ specifications. Not for use on "EG" rolled or cut grooved pipe ends. The pipe end must be smooth and free from metal burrs, sharp edges or projections.

2 Gasket Preparation

Ensure the gasket is suitable for the intended application by referring to the ASC gasket compatibility chart. Apply a light coating of Gruvlok® Lubricant to exposed gasket surfaces.

3 Assembly

The SlideLOK Figure 74 may be installed by one of two methods. The preferred method depends on the type of pipe components being joined and their orientation. Please review both methods before installing.

Step 3 – Method No. 1

Slide the SlideLOK coupling completely over the grooved pipe end. This will allow a clear and un-obstructed view of the pipe for correct alignment.

A. Slide the coupling on the pipe past the groove. The bolts and nuts can be hand tightened to position the coupling in place.

B. Align the mating pipe end. Align the two adjoining pipes together.

C. Slide the coupling back over the grooves so that the coupling keys are located over the respective grooves on both pipe ends.

D. Follow the instructions on fastening the coupling as shown in Step 4.

GRUVLOK
An ASC Engineered Solution

Fig. 74 SlideLOK® Ready for Installation
Coupling Installation (Continued)

Step 3 – Method No. 2

Slide the SlideLOK coupling half way onto the pipe end or fitting. This will better accommodate fitting, and valve accessories during installation.

A. Slide the coupling on the fitting so that the groove and keys are aligned.

B. Bring the pipe end or fitting towards the coupling and insert so that the groove and coupling keys are aligned.

C. Hand tighten the nuts to correctly position the couplings keys over the respective grooved ends.

D. Follow the instructions on fastening the coupling as shown in Step 4.


3–2AB


3–2CD

4 Tighten Nuts

Securely tighten nuts alternately and equally, keeping the gaps at the bolt pads evenly spaced.

Notice: Uneven tightening may cause the gasket to pinch. Gasket should not be visible between segments after bolts are tightened.

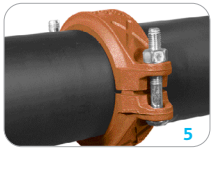
WARNING: Proper tightening of coupling bolts is required to obtain specified performance. Over tightening the bolts may result in joint damage. Pipe joint separation may result in significant property damage and serious injury.


4

5 Assembly is Complete

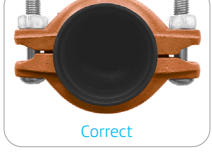
Visually inspect the pipe joint to assure the coupling keys are fully engaged in the pipe grooves. The bolt pads are to have equal gaps on each side of the coupling.

Notice: Visually inspect both sides of the coupling to ensure gaps between bolt pads are evenly spaced and are parallel. Any deviations must be corrected before placing coupling into service.


5

Maximum Bolt Torque

Bolt Size (In.)	Wrench Size (In.)	Ft-Lbs
½	⅞	120
⅝	1 1/16	235
¾	1½	425


Correct

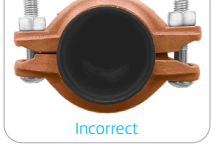

Incorrect

Fig. 74 SlideLOK® Ready for Installation Coupling Re-Installation

Reinstallation of the Fig. 74 Slidelok Coupling

The SlideLOK coupling is designed to be installed in the ready for installation assembly position once. After the initial assemble the following steps are to be taken to re-install the Fig. 74 SlideLOK coupling.

1 De-Pressurize the System

De-pressurize the system before removing the SlideLOK Coupling. Dis-assemble the couplings by removing the nuts, bolts and gasket from the housing halves. A wrench is required to overcome the epoxy used to secure the nuts on the bolts.

2 Pipe Preparation

Pipe ends are to be rolled or cut grooved according to ASC Engineered Solutions™ specifications. Not for use on "EG" rolled or cut grooved pipe ends. The pipe end must be smooth and free from metal burrs, sharp edges or projections.

3

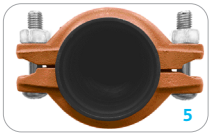
3 Gasket Preparation

Ensure the gasket is suitable for the intended application by referring to the Anvil gasket compatibility chart. A light coating of Gruvlok® lubricant must be applied to the gasket prior to installation.


4

4 Pipe Alignment and Gasket Installation

Slide the gasket onto the pipe then align the two pipe ends together. Pull the gasket into position, centering it between the grooves on each pipe. Gasket should not extend into the groove on either pipe.


5

5 Housing Assembly

Place each housing halves on the pipe making sure the housing key fits into the groove. Be sure that the tongue and recess portions of the housing mate properly. Insert the bolts.

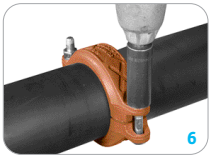
Fig. 74 SlideLOK® Ready for Installation
Coupling Re-Installation (Continued)

6 Tighten Nuts

Securely tighten nuts alternately and equally, keeping the gaps at the bolt pads evenly spaced.

Notice: Uneven tightening may cause the gasket to pinch. Gasket should not be visible between segments after bolts are tightened.

WARNING: Proper tightening of coupling bolts is required to obtain specified performance. Over tightening the bolts may result in joint damage. Pipe joint separation may result in significant property damage and serious injury.



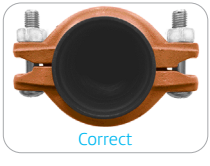
Maximum Bolt Torque

Bolt Size (In.)	Wrench Size (In.)	Ft.-Lbs
½	⅞	120
⅝	1 1/16	235
¾	1 ½	425

7 Assembly is Complete

Visually inspect the pipe joint to assure the coupling keys are fully engaged in the pipe grooves. The bolt pads are to have equal gaps on each side of the coupling.

Notice: Visually inspect both sides of the coupling to ensure gaps between bolt pads are evenly spaced and are parallel. Any deviations must be corrected before placing coupling into service.


Correct

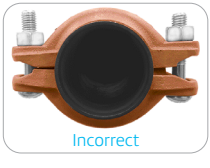

Incorrect

Fig. 70 SlideFLEX™ Ready for Installation
Flexible Coupling Installation

1 Pipe Preparation

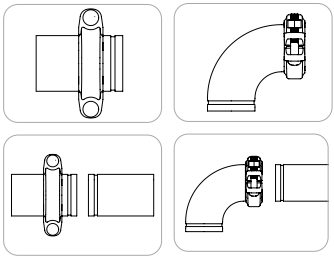
Pipe ends are to be rolled or cut grooved according to ASC Engineered Solutions™ specifications. Not for use on "EG" rolled or cut grooved pipe ends. The pipe end must be smooth and free from metal burrs, sharp edges or projections.

2 Gasket Preparation

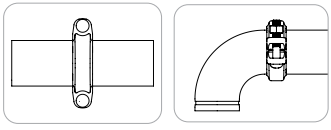
Ensure the gasket is suitable for the intended application by referring to the ASC gasket compatibility chart. Apply a light coating of Gruvlok® Lubricant to exposed gasket surfaces.

3 Assembly

Slide the coupling on pipe or fitting. The bolts and nuts can be hand tightened to limit coupling movement during the next steps.



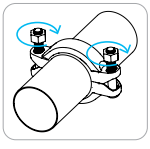
Bring ends of adjoining pipes or fittings together.



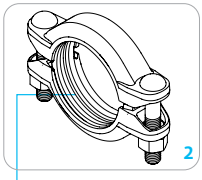
Adjust coupling to ensure all grooves and couplings keys are aligned.

4 Tighten Nuts

Securely tighten nuts alternately and equally until the bolt pads make metal-to-metal contact.



NOTICE: Uneven tightening may cause gasket to pinch. Gasket should not be visible between segments after bolts are tightened

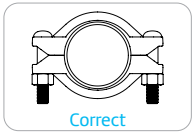


Apply thin coat of lubricant. Keep foreign particles from adhering.

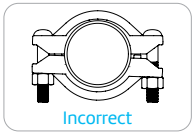
5 Assembly is Complete

Visually inspect the pipe joint to ensure the coupling keys are fully engaged in the pipe grooves. The bolt pads are to have metal-to-metal contact on each side of the coupling.

NOTICE: Visually inspect both sides of the coupling to ensure there are no gaps between bolt pads. Any deviations must be corrected before placing coupling into service.



Correct

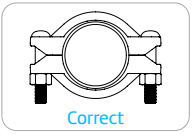


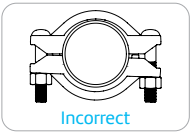
Incorrect

Fig. 70 SlideFLEX™ Ready for Installation Flexible Coupling Re-Installation

Reinstallation of the Figure 70 SlideFLEX™ Ready for Installation Flexible Coupling

The SlideFLEX coupling is designed to be installed in the ready for installation assembly position once. After the initial assemble the following steps are to be taken to re-install the Fig. 70 SlideFLEX coupling.





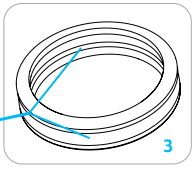
1 De-pressurize the System

De-pressurize the system before removing the SlideLOK Coupling. Dis-assemble the couplings by removing the nuts, bolts and gasket from the housing halves. A wrench is required to overcome the epoxy used to secure the nuts on the bolts.

2 Pipe Preparation

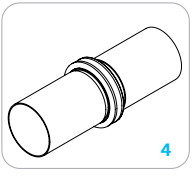
Pipe ends are to be rolled or cut grooved according to ASC specifications. Not for use on "EG" rolled or cut grooved pipe ends. The pipe end must be smooth and free from metal burrs or projections.

Apply thin coat of lubricant Keep foreign particles from adhering.



3 Gasket Preparation

Ensure the gasket is suitable for the intended application by referring to the ASC gasket compatibility chart. A light coating of Gruvlok® XTreme™ lubricant must be applied to the gasket prior to installation.

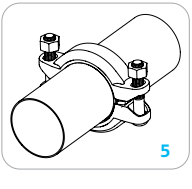


4 Pipe Alignment and Gasket Installation

Slide the gasket onto the pipe then align the two pipe ends together. Pull the gasket into position, centering it between the grooves on each pipe. Gasket should not extend into the groove on either pipe.

5 Housing Assembly

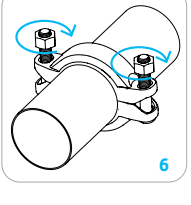
Place each housing halves on the pipe making sure the housing key fits into the groove. Be sure that the tongue and recess portions of the housing mate properly. Insert the bolts.



6 Tighten Nuts

Securely tighten nuts alternately and equally to the specified bolt torque, keeping the gaps at the bolt pads evenly spaced.

CAUTION: Uneven tightening may cause the gasket to pinch. Gasket should not be visible between segments after bolts are tightened.



7 Assembly is Complete

Visually inspect the pipe joint to assure the coupling keys are fully engaged in the pipe grooves. The bolt pads are to have equal gaps on each side of the coupling.

Fig. 64 CTS SlideLOK®
Ready for Installation Coupling

Ready For Installation Right Out Of The Box

Do not disassemble the CTS SlideLOK™ Coupling. The Figure 64 coupling is ready for installation. The bolt and gasket do not need to be removed.

1 Copper Tube Preparation

Copper tube ends are to be roll grooved copper tube according to ASC specifications. The tube end must be smooth and free from metal burrs or projections.

2 Gasket Preparation

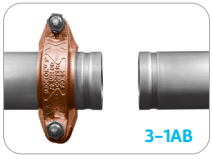
Ensure the gasket is suitable for the intended application by referring to the ASC gasket compatibility chart.
Apply a light coating of Gruvlok Lubricant to exposed gasket surfaces.

3 Assembly

The CTS SlideLOK Figure 64 may be installed by one of two methods. The preferred method depends on the type of components being joined and their orientation. Please review both methods before installing.

Step 3 – Method No. 1

Slide the CTS SlideLOK coupling completely over the grooved copper tube end. This will allow a clear and un-obstructed view of the tube for correct alignment.



A. Slide the coupling on the copper tube past the groove. The bolts and nuts can be hand tightened to position the coupling in pace.
B. Align the mating copper tube end. Align the two adjoining tubes together.
C. Slide the coupling back over the grooves so that the coupling keys are located over the respective grooves on both copper tube ends.
D. Follow the instructions on fastening the coupling as shown in Step 4.

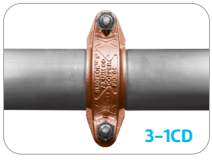


Fig. 64 CTS SlideLOK® Ready for Installation Coupling (Continued)

Step 3 – Method No. 2

Slide the CTS SlideLOK coupling half way onto the copper tube end or fitting. This will better accommodate fitting, and valve accessories during installation.

A. Slide the coupling on the fitting so that the groove and keys are aligned.

B. Bring the copper tube end or fitting towards the coupling and insert so that the groove and coupling keys are aligned.

C. Hand tighten the nuts to correctly position the couplings keys over the respective grooved ends.

D. Follow the instructions on fastening the coupling as shown in Step 4.

4 Final Assembly

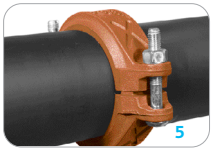
Securely tighten nuts alternately and equally, keeping the gaps at the bolt pads evenly spaced.

Notice: Uneven tightening may cause the gasket to pinch. Gasket should not be visible between segments after bolts are tightened.

5 Assembly is complete

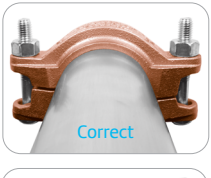
Visually inspect the pipe joint to assure the coupling keys are fully engaged in the pipe grooves. The bolt pads are to have equal gaps on each side of the coupling.

Notice: Visually inspect both sides of the coupling to ensure gaps between bolt pads are evenly spaced and are parallel. Any deviations must be corrected before placing coupling into service.



ANSI Specified Bolt Torque

Size	Torque
In.	Ft.-Lbs
2	45–60
2½–4	80–100
5–8	100–130



GRUVLOK
An ASC Engineered Solution

Fig. 64 CTS SlideLOK® Rigid Coupling Re-Installation

Re-Installation of the Fig. 64 CTS SlideLOK™ Coupling

The CTS SlideLOK coupling is designed to be installed in the ready for installation assembly position once. After the initial assemble the following steps are to be taken to re-install the Fig. 64 CTS SlideLOK coupling.

1 De-pressurize the System

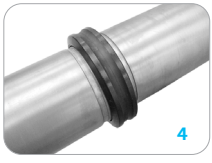
De-pressurize the system before removing the CTS SlideLOK Coupling. Disassemble the couplings by removing the nuts, bolts and gasket from the housing halves. A wrench is required to overcome the epoxy used to secure the nuts on the bolts.

2 Copper Tube Preparation

Copper tube ends are to be roll grooved copper tube according to ASC specifications. The tube end must be smooth and free from metal burrs or projections.

3 Gaket Preparation

Ensure the gasket is suitable for the intended application by referring to the Anvil gasket compatibility chart.
A light coating of Gruvlok lubricant must be applied to the gasket prior to installation.



4 Copper Tube Alignment and Gasket Installation

Slide the gasket onto the copper tube then align the two tube ends together. Center the gasket between the grooves on each copper tube. Gasket should not extend into the groove on either copper tube.

5 Housing Assembly

Place each of the housing halves on the copper tube making sure the housing key fits into the groove. Be sure that the tongue and recessed portions of the housings mate properly. Insert the bolts and loosely install the nuts.

ANSI Specified Bolt Torque

Size	Torque
In.	Ft.-Lbs
2	45–60
2½–4	80–100
5–8	100–130

Fig. 64 CTS SlideLOK® Rigid Coupling Re-Installation (Continued)

6 Tighten Nuts

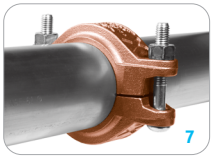
Securely tighten nuts alternately and equally, keeping the gaps at the bolt pads evenly spaced.

Notice: Uneven tightening may cause the gasket to pinch. Gasket should not be visible between segments after bolts are tightened.

7 Assembly is Complete

Visually inspect the pipe joint to assure the coupling keys are fully engaged in the pipe grooves. The bolt pads are to have equal gaps on each side of the coupling.

Notice: Visually inspect both sides of the coupling to ensure gaps between bolt pads are evenly spaced and are parallel. Any deviations must be corrected before placing coupling into service.



Notes:

Fig. 7010 Reducing Coupling

CAUTION: Proper torquing of coupling bolts is required to obtain specified performance. Over torquing the bolts may result in damage to the bolt and / or casting which could result in pipe joint separation. Under torquing the bolts may result in lower pressure retention capabilities, lower bend load capabilities, joint leakage and pipe joint separation. Pipe joint separation may result in significant property damage and serious injury.

1 Check & Lubricate Gasket

Check gasket to be sure it is compatible for the intended service. Apply a thin coating of Gruvlok lubricant to outside and sealing lips of the gasket. Be careful that foreign particles do not adhere to lubricated surfaces.

2 Gasket Installation

Place the smaller opening of the gasket over the smaller pipe. Angle the gasket over the pipe end and pull the gasket lip open around the circumference of the pipe. The center leg of the gasket should make flush contact with the pipe end and will prevent telescoping of the smaller pipe inside the larger.

3 Alignment

Align the adjoining pipe center lines, and insert the larger pipe end into the gasket. Angle the pipe end slightly to the face of the gasket and tilt the pipe into the gasket to ease assembly.

4 Housings

Place the coupling housing halves over the gasket making sure the housing keys engage the grooves. Insert bolts and turn nuts finger tight.

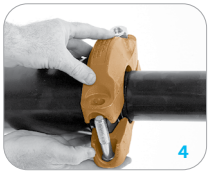
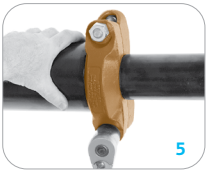


Fig. 7010 Reducing Coupling (Continued)

5 Tighten Nuts

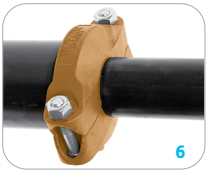
Tighten the nuts alternately and equally to the specified bolt torque.* The housing bolt pads must make metal-to-metal contact.

CAUTION: Uneven tightening may cause the gasket to pinch.



6 Assembly Complete

Visually inspect the pipe joint to assure the coupling keys are fully engaged in the pipe grooves and the bolt pads are in firm even metal-to-metal contact on both sides of the coupling.



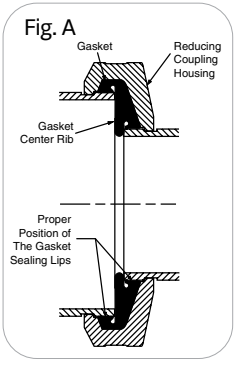


Fig. A

NOTE: Fig. A illustrates the correct position of the Fig. 7010 Reducing Coupling gasket and housing properly assembled onto adjacent pipe ends.

CAUTION: In vertical installations the pipes must be supported to prevent telescoping during installation.

Notes:

Fig. 7012 Gruvlok® Flange (2"–12")

WARNING

Read and understand all instructions before use. Ensure system is drained and depressurized before installation or service. Use appropriate personal protective equipment.

Failure to follow these instructions could result in serious personal injury and/or property damage.

Applications which require a Gruvlok Flange Adapter Insert:

1. When mating to a wafer valve (lug valve), if the valve is rubber faced in the area designated by the sealing surface dimensions (A Max. to B Min.), place the Gruvlok Flange Adapter Insert between the valve and the Gruvlok Flange.
2. When mating to a rubber-faced metal flange, the Gruvlok Flange Adapter Insert is placed between the Gruvlok Flange and the rubber-faced flange.
3. When mating to a serrated flange surface, a standard full-faced flange gasket is installed against the serrated flange face, and the Gruvlok Flange Adapter Insert is placed between the Gruvlok Flange and the standard flange gasket.
4. When mating to valves or other component equipment where the flange face has an insert, use procedure described in note 3.

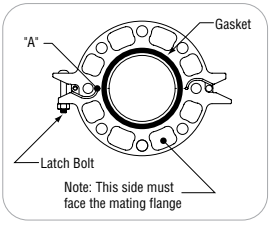
Check pipe end for proper grooved dimensions and to assure that the pipe end is free of indentations and projections that would prevent proper sealing of the Gruvlok flange gasket.

1 Install Housings

On the side without the hinge pin, loosen the latch bolt nut to the end of the bolt thread. (It is not necessary to remove the nut from the latch bolt.) Swing the latch bolt out of the slot. Open the Gruvlok Flange and place around the grooved pipe end with the key section fitting into the groove. The flange gasket cavity must face the pipe end.

2 Latch Housings

Place the latch bolt back into the slotted hole. Tighten the nut until there is a 1/16" gap between the flange halves at location "A". (See Figure below)



3 Check & Lubricate Gasket

Check the gasket to assure that it is properly suited for the intended service. Lubricate the entire exterior surface of the gasket, including the sealing lips, using the proper Gruvlok lubricant.

WARNING: The Gruvlok Flange gasket must be inserted so that the sealing lips face toward the pipe end and the mating flange. The lip of the gasket, sealing on the pipe, should not extend beyond the pipe end. The pipe should extend out beyond the end of the sealing lip by approximately 1/8" on the 2"–6" sizes and 3/16" on the 8"–12" sizes.

Fig. 7012 Gruvlok® Flange (2"–12") (Continued)

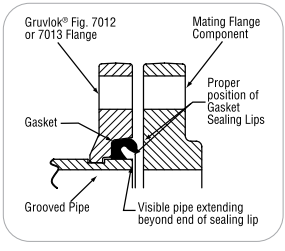
WARNING

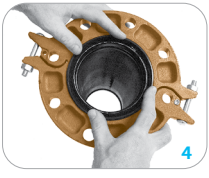
Read and understand all instructions before use. Ensure system is drained and depressurized before installation or service. Use appropriate personal protective equipment.

Failure to follow these instructions could result in serious personal injury and/or property damage.

4 Install Gasket

Stretch the Gruvlok gasket around the pipe end and then press the gasket into the cavity between the pipe O.D. and the flange. The gasket must be properly positioned as shown in the figure below.





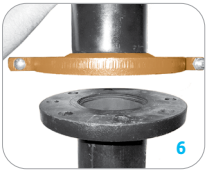
5 Lubricate Gasket Lip

With the gasket in place apply lubricant to the exposed gasket tip, which will seal on the mating flange.

Tighten the nuts on the latch bolts alternately to the specified latch bolt torque. The flange housings must be in firmmetal–to–metal contact.

6 Inspect Mating Flange

Verify that the mating flange face is hard, flat and smooth, free of indentations, which would prevent proper sealing of the Gruvlok Flange gasket. Assure the gasket is still in the proper position and align Gruvlok Flange bolt holes with the mating flange, pump, tank, etc., bolt holes.



7 Install Bolting

Insert a flange bolt or stud with material properties of SAE J429 Grade 5 or higher through the bolt holes and thread a nut on hand tight. Continue this procedure until all bolt holes have been fitted. Tighten the nuts alternately and evenly so the flange faces remain parallel. All the bolts or studs must be torqued to the mating flange bolts specified torque. The flange faces should have metal-to-metal contact.

WARNING: It is important to line up the bolt holes before bringing the two flanges together. Sliding the flanges into place will dislodge the gasket and cause leakage to occur. When using a flange insert, it is important that the insert is properly aligned with the gasket prior to tightening the bolts.

Fig. 7012 Gruvlok® Flange (2"–12") (Continued)

WARNING

Read and understand all instructions before use. Ensure system is drained and depressurized before installation or service. Use appropriate personal protective equipment.

Failure to follow these instructions could result in serious personal injury and/or property damage.

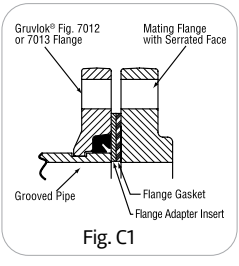


Fig. C1

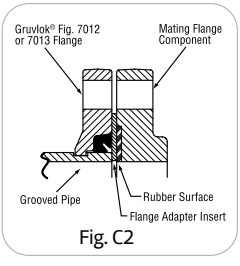


Fig. C2

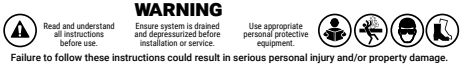
Fig. C1 & C2

NOTE: The Gruvlok Fig. 7012 Flange requires the use of a Flange Adapter Insert when used against rubber surfaces (Figure C1), serrated flange surfaces or mating flanges with inserts (Figure C2). The Flange Adapter Insert will be exposed to the fluids in the system. Ensure that the Insert is compatible with the fluids in the systems and with adjacent piping components.

WARNING: Do not use a steel Flange Adapter Insert in copper systems or in systems where galvanic corrosion is possible.

CAUTION: Proper torquing of flange bolts is required to obtain specified performance. Over torquing the bolts may result in damage to the bolt and / or casting which could result in pipe joint separation. Under torquing the bolts may result in lower pressure retention capabilities, lower bend load capabilities, joint leakage and pipe joint separation. Pipe joint separation may result in significant property damage and serious injury.

Fig. 7012 Gruvlok® Flange (14"–24")



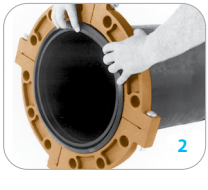
Gruvlok® Flanges of 14" size and larger are cast in four segments to ease handling during assembly. Figure 7012 Gruvlok Flanges should not be used with tie rods nor in a configuration with a wafer valve between two 7012 flanges.

1 Install Housing

Place each Gruvlok Flange segment around the grooved pipe with the key section fitting into the groove and the flange gasket cavity facing the pipe end. Loosely assemble the segments using the four segment-bolts-and nuts. Alternately and equally tighten the latch bolts and nuts to the specified latch bolt torque. Bring the four flange segments into full, firm metal-to-metal contact.

NOTE: An alternative method of assembly is to loosely preassemble two segments into two equal halves of the flange leaving a small gap (approximately 1/8") between the two segments of each flange- half. Place the flange halves around the pipe and complete the assembly as described in Step 1, above.

2 Install Gasket

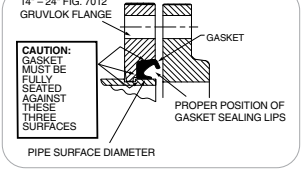


Check the gasket grade to verify that it is properly suited for the intended service.

Lubricate the entire surface of the gasket and the flange cavity using the appropriate Gruvlok Lubricant. Place the Gruvlok Flange Gasket around the pipe end by pressing the gasket into the cavity between the pipe O.D. and flange recess. Move around the gasket in both directions until the gasket is fully seated in the flange gasket cavity.

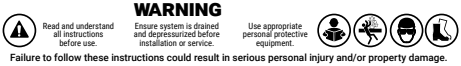
3 Gasket Position

The correct position and relationship of the components of the Gruvlok Flange assembly is shown in the Figure to the right. The wide gasket lip must seal on the pipe surface diameter and the narrow gasket lip must face the mating flange. Be careful that foreign particles do not adhere to lubricated surfaces.



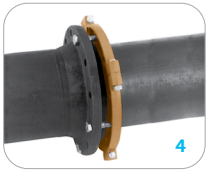
GRUVLOK
An ASC Engineered Solution

Fig. 7012 Gruvlok® Flange (14"–24") (Continued)



NOTE: Design of the Gruvlok Flange provides sealing only with the special Gruvlok Flange gasket. Only Gruvlok Flange gaskets may be used with Fig. 7012 flanges.

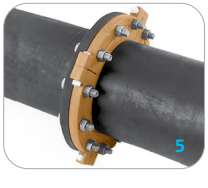
4 Inspect & Mate Flange



Align the Gruvlok Flange bolt holes with mating flange bolt holes. Insert a flange bolt or stud with material properties of SAE J429 Grade 5 or higher through the bolt holes and thread a nut on hand tight. Insert the next bolt or stub opposite the first and again thread the nut on hand tight. Continue this procedure until all bolt holes have been fitted. Insertion of the flange bolts prior to contact of the f langes will help in the alignment of the flanges. Pull the two flanges into contact using care to assure that the gasket remains fully seated within the gasket cavity during assembly.

NOTE: Take care to assure that the gasket lip is not bent backwards and pinched between the two flanges.

5 Install Bolting



Tighten the nuts evenly to the specified mating face bolt torque so that the flange faces remain parallel and make firm even contact around the entire flange.

CAUTION: Proper torquing of flange bolts is required to obtain specified performance. Over torquing the bolts may result in damage to the bolt and / or casting which could result in pipe joint separation. Under torquing the bolts may result in lower pressure retention capabilities, lower bend load capabilities, joint leakage and pipe joint separation. Pipe joint separation may result in significant property damage and serious injury.

CAUTION: Use of an impact wrench is not recommended because the torque output can vary significantly due to many variables including air pressure supply, battery strength and operational variations.

Fig. 7045 & Fig. 7046 Clamp-T® Branch Outlets

ALWAYS USE A GRUVLOK LUBRICANT FOR PROPER COUPLING ASSEMBLY.

Thorough lubrication of the gasket is essential to assist the gasket into the proper sealing position.

1 Pipe Preparation

Cut the appropriate size hole in the pipe and remove any burrs. Be sure to remove any debris from inside the pipe. Clean the gasket sealing surface within ⅝" of the hole and visually inspect the sealing surface for defects that may prevent proper sealing of the gasket.

Branch Size	Hole Saw Size
In.	In./(+⅛, -0)
½, ¾, 1	1½
1¼, 1½	2
2	2½
2½	2¾
3	3½
4	4½

2 Check & Lubricate Gasket

Check the gasket to be sure it is compatible for the intended service. Apply a thin layer of Gruvlok lubricant to the back surface of the gasket. Be careful that foreign particles do not adhere to the lubricated surfaces. Insert the gasket back into the outlet housing making sure the tabs in the gasket line up with the tab recesses in the housing.

2

3 Gasket Installation

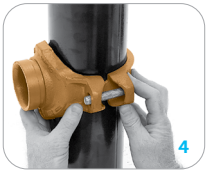
Lubricate the exposed surface of the gasket. Align the outlet housing over the pipe hole making sure that the locating collar is in the pipe hole.


3

GRUVLOK
An ASC Engineered Solution

Fig. 7045 & Fig. 7046
Clamp-T® Branch Outlets (Continued)

4 Alignment
Align the strap around the pipe, insert the bolts and tighten the nuts finger tight. Some sizes use a U-bolt design.



5 Tighten Nuts
Alternately and evenly tighten the nuts to the specified bolt torque.

6 Assembly is Complete

Figs. 7045 & 7046 Specified Bolt Torque

Specified bolt torque is for the oval neck track bolts and U-bolts used on the Gruvlok Clamp-T's.
The nuts must be tightened alternately and evenly until fully tightened.

CAUTION: Use of an impact wrench is not recommended because the torque output can vary significantly due to many variables including air pressure, battery strength and operational variations.

CAUTION: Proper torquing of the bolts or U-bolts is required to obtain the specified performance. Overtorquing the bolts or U-bolts may result in damage to the bolt, U-bolt and / or casting which could result in lower pressure retention capabilities, lower bend load capabilities, pipe joint leakage and pipe joint separation.

ANSI Specified Bolt Torque

Bolt Size	Wrench Size	Specified Bolt Torque*
In.	In.	Ft.-Lbs
U-Bolt	⅞	30–40
½	⅞	60–80
⅝	1 1/16	100–130
¾	1¼	130–180

*Non-lubricated bolt torques.

Fig. 7305 HDPE Coupling

WARNING

Read and understand all instructions before use. Ensure system is drained and depressurized before installation or service. Use appropriate personal protective equipment.

Failure to follow these instructions could result in serious personal injury and/or property damage.

1 Pipe Preparation

Ensure the HDPE pipe ends are square cut to 1/8" maximum for 2" to 4" sizes and 5/32" maximum for 6" sizes and larger. Ensure the gasket seating surface on each pipe end is clean and smooth for proper gasket sealing. Mark each pipe at a distance from the end as described in the table to the right:

Size	Distance to Mark
In./mm	In./mm
2–4 51–102	1 25.4
5–12 127–305	1½ 38.1
14–18 355–457	1¾ 44.5

2 Check and Lubricate Gasket

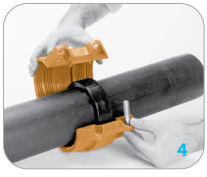
Check to assure the gasket material is acceptable for the intended service. The gasket color code is green for EPDM and orange for Nitrile (Buna-N).

CAUTION: Use only Gruvlok Xtreme™ Lubricant. Gruvlok Xtreme Lubricant contains silicone. If silicone is unacceptable for the application contact Gruvlok for the lubrication recommendation. Apply a thin coating of Gruvlok Xtreme Lubricant to the gasket lip and the exterior surface of the gasket.

CAUTION: For proper coupling performance, the gasket seating surface of each pipe end must be free of scratches, indentations, projections, or other imperfections that could prevent proper sealing of the gasket.

3 Gasket Installation

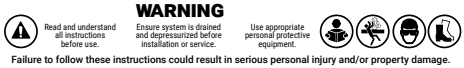
Slip the gasket over one of the pipe ends. Make sure the gasket does not overhang the pipe end. Align the second pipe and while keeping the pipes in the butted position slide the gasket back over the second pipe end. The gasket must be positioned centrally between the lines on the pipe ends.



4 Housings

Place the Figure 7305 housing over the gasket, making sure the tongue on one half is aligned with the recess of the other half.

Fig. 7305 HDPE Coupling (Continued)



5 Tighten Nuts

Insert the bolts and secure the nuts alternately and uniformly until the bolt pads are in contact. Torque all bolts to the required bolt torque levels. Refer to the Specified Bolt Torque Table. Alternate and even tightening of the bolts will significantly reduce the torque needed to close the gap at the pipe joint.

CAUTION: To ensure proper performance, the Figure 7305 HDPE coupling should always be installed with the bolt pads making metal to metal contact.

Specified Bolt Torque

Specified bolt torque is for the oval neck track bolts used on Gruvlok® couplings. The nuts must be tightened alternately and evenly until fully tightened.

CAUTION: Use of an impact wrench is not recommended because the torque output can vary significantly due to many variables including air pressure supply, battery strength and operational variations.

CAUTION: Proper torquing of coupling bolts is required to obtain specified performance. Over torquing the bolts may result in damage to the bolt and / or casting which could result in pipe joint separation. Under torquing the bolts may result in lower pressure retention capabilities, lower bend load capabilities, joint leakage and pipe joint separation. Pipe joint separation may result in significant property damage and serious injury.

Fig. 7305 Specified Bolt Torque

Coupling Bolts	Minimum	Maximum
In.	Ft.-Lbs./N-m	Ft.-Lbs./N-m
½ X 2⅜,½ X 3	80 110	100 150
⅝ X 3½,⅝ X 3¾	100 135	130 175
¾ X 4¾	130 175	180 245
1 X 5½	200 270	250 340

Fig. 7307 HDPE Transition Coupling

WARNING

Read and understand all instructions before use.

Ensure system is drained and depressurized before installation or service.

Use appropriate personal protective equipment.

Failure to follow these instructions could result in serious personal injury and/or property damage.

1 Pipe Preparation

Ensure the HDPE pipe ends are square cut to $^{1}/_{8}$" maximum for 2" to 4" sizes and $^{5}/_{32}$" maximum for 6" sizes and larger. The steel pipe must be grooved in accordance with Gruvlok Grooving Specification for Steel Pipe in the Technical Data Section. Ensure the gasket seating surface on each pipe end is clean and smooth for proper gasket sealing.

CAUTION: For proper coupling performance, the gasket seating surface of the HDPE pipe end must be free of scratches, indentations, projections, or other imperfections that could prevent proper sealing of the gasket.

2 Check and Lubricate Gasket

Check to assure the gasket material is acceptable for the intended service. The gasket color code is green for EPDM and orange for Nitrile (Buna-N).

CAUTION: Use only Gruvlok Xtreme™ Lubricant. Gruvlok Xtreme Lubricant contains silicone. If silicone is unacceptable for the application contact Gruvlok for the lubrication recommendation. Apply a thin coating of Gruvlok Xtreme Lubricant to the gasket lip and the exterior surface of the gasket.

3 Gasket Installation

Slip the gasket over one of the pipe ends. Make sure the gasket does not overhang the pipe end. Align the second pipe and while holding it in the butted position, slide the gasket back over the second pipe end. The gasket must be positioned on the gasket seat surface of the grooved steel pipe. Make sure the gasket does not overhang into the pipe groove.

4 Housings

Place each half of the coupling housing over the gasket, making sure the housing grooved end is directed into the pipe groove.

GRUVLOK
An ASC Engineered Solution

Fig. 7307 HDPE Transition Coupling (Continued)

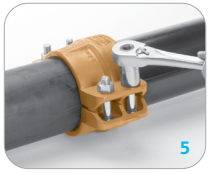
WARNING

Read and understand all instructions before use. Ensure system is drained and depressurized before installation or service. Use appropriate personal protective equipment.

Failure to follow these instructions could result in serious personal injury and/or property damage.

5 Tighten Nuts

Insert the bolts and secure the nuts alternately and uniformly until the bolt pads make contact. Torque all bolts to the required bolt torque levels shown in the Specified Bolt Torque Table. Alternate and even tightening of the bolts will significantly reduce the torque needed to close the coupling.



CAUTION: To ensure proper performance, the Figure 7307 HDPE transition coupling should always be installed with the bolt pads making metal to metal contact.

Specified Bolt Torque

Specified bolt torque is for the oval neck track bolts used on Gruvlok® couplings. The nuts must be tightened alternately and evenly until fully tightened.

CAUTION: Use of an impact wrench is not recommended because the torque output can vary significantly due to many variables including air pressure supply, battery strength and operational variations.

CAUTION: Proper torquing of coupling bolts is required to obtain specified performance. Over torquing the bolts may result in damage to the bolt and / or casting which could result in pipe joint separation. Under torquing the bolts may result in lower pressure retention capabilities, lower bend load capabilities, joint leakage and pipe joint separation. Pipe joint separation may result in significant property damage and serious injury.

Fig. 7307 Specified Bolt Torque

Coupling Bolts	Minimum	Maximum
In./DN(mm)	In./mm	Lbs./kg
½ x 2⅜	80 110	100 150
½ x 3	80 110	100 150
⅝ x 3 ½	100 135	130 175

Fig. 7307 Specified Bolt Torque

Coupling Bolts	Minimum	Maximum
In./DN(mm)	In./mm	Lbs./kg
⅝ x 3¾	100 135	130 175
¾ x 4¾	130 175	180 245
⅞ x 5½	180 245	220 300

Fig. 7312 HDPE Flange Adapter

WARNING

Read and understand all instructions before use. Ensure system is drained and depressurized before installation or service. Use appropriate personal protective equipment.

Failure to follow these instructions could result in serious personal injury and/or property damage.

1. Pipe Preparation

Ensure the HDPE pipe ends are square cut to ⅛" maximum for 2" to 4" sizes and 5/32" maximum for 6" sizes and larger. Inspect the surface of the mating flange to ensure the gasket seating surface is clean and smooth for proper gasket sealing.

CAUTION: For proper coupling performance, the gasket seating surface of each pipe end must be free of scratches, indentations, projections, or other imperfections that could prevent proper sealing of the gasket.

2 Check & Lubricate Gasket

Check to assure the gasket material is acceptable for the intended service. The Gasket color code is green for EPDM and orange for Nitrile (Buna-N).

CAUTION: Use only Gruvlok Xtreme Lubricant. Gruvlok Xtreme Lubricant contains silicone. If silicone is unacceptable for the application contact Gruvlok for the lubrication recommendation. Apply a thin coating of Gruvlok Xtreme Lubricant to the gasket lip and the exterior surface of the gasket.

3 Housing

Place the housing over the end of the pipe and using a straight edge, align the face and the flange face with the end of the pipe. Do not let the pipe extend beyond the flange face.

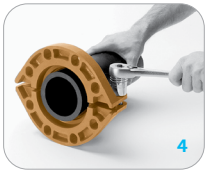
4 Latch Housing

Tighten the housing nut until the housing bolt pads make firm metal to metal contact. Torque all bolts to the required latch bolt torque levels. Refer to the Specified Latch Bolt Torque Table.

CAUTION: For proper performance, the Figure 7312 HDPE Flange adapter should always be installed with the housing bolt pads making metal to metal contact.

5 Install Gasket

Position the Gruvlok Flange gasket around the pipe end and press the gasket into the flange gasket pocket. Be sure the flange sealing lips are facing out.



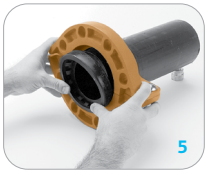


Fig. 7312 HDPE Flange Adapter (Continued)

WARNING

Read and understand all instructions before use. Ensure system is drained and depressurized before installation or service. Use appropriate personal protective equipment.

Failure to follow these instructions could result in serious personal injury and/or property damage.

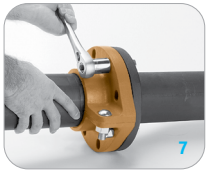
6 Align Pipe

Align the Gruvlok Flange bolt holes with the mating flange bolt holes. Insert a standard bolt or stud through one bolt hole and thread the nut on hand tight. Insert the next bolt or stud opposite the first and thread the nut on hand tight. Continue this procedure until all holes have been fitted.

CAUTION: Take care to assure the gasket lip is not bent backwards and pinched between the two flanges.

7 Tighten Bolts

Tighten the flange face nuts alternately and evenly so that the flange faces remain parallel and make firm contact around the entire flange. Torque all bolts to the required mating flange joint torque levels. Refer to the Specified Mating Flange Bolt Torque Table.



Specified Bolt Torque for Latch & Mating Flange Bolts

Specified bolt torque is for the latch and mating flange bolts used on Gruvlok flanges. The nuts must be tightened alternately and evenly until fully tightened.

CAUTION: Use of an impact wrench is not recommended because the torque output can vary significantly due to many variables including air pressure supply, battery strength and operational variations.

CAUTION: Proper torquing of latch and mating flange bolts is required to obtain specified performance. Over torquing the bolts may result in damage to the bolt and / or casting which could result in pipe joint separation. Under torquing the bolts may result in lower pressure retention capabilities, lower bend load capabilities, joint leakage and pipe joint separation. Pipe joint separation may result in significant property damage and serious injury.

Latch Bolt Torque

Coupling Bolts	Minimum	Maximum
In./DN(mm)	Ft.-Lbs/N-m	Ft.-Lbs/N-m
⅝ x 2	100 135	130 175
¾ x 3½	130 175	180 245

Mating Flange Bolt Torque

Coupling Bolts	Minimum	Maximum
In.	Ft.-Lbs/N-m	Ft.-Lbs/N-m
⅝ x 3	110 149	140 190
¾ x 3½	220 298	250 339

Fig. 7004 Coupling

WARNING

Read and understand all instructions before use. Ensure system is drained and depressurized before installation or service. Use appropriate personal protective equipment.

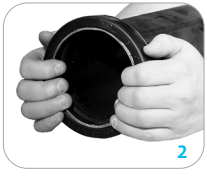
Failure to follow these instructions could result in serious personal injury and/or property damage.

1 Check & Lubricate Gasket

Check gasket to be sure it is compatible for the intended service. Apply a thin coat of Gruvlok Lubricant to outside and sealing lips of the gasket. Be careful that foreign particles do not adhere to lubricated surfaces.

2 Gasket Installation

Slip the gasket over the pipe end, making sure the gasket lip does not overhang the pipe end.



3 Alignment

After aligning the two pipe ends together, pull the gasket into position, centering it between the grooves on each pipe. Gasket should not extend into the groove on either pipe.

4 Housings

Place each housing halves on the pipe making sure the housing key fits into the groove. Be sure that the tongue and recess portions of the housing mate properly. Insert the bolts and run up the nuts finger tight.

CAUTION: When using an impact wrench, verify that the output of the torque wrench is within the required torque range. It is recommended that a torque wrench be used for accurate assembly in order to obtain specified performance.

GRUVLOK
An ASC Engineered Solution

Fig. 7004 Coupling (Continued)

WARNING

Read and understand all instructions before use. Ensure system is drained and depressurized before installation or service. Use appropriate personal protective equipment.

Failure to follow these instructions could result in serious personal injury and/or property damage.

5 Tighten Nuts

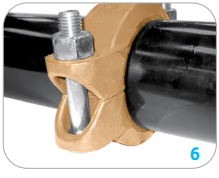
Securely tighten nuts alternately and equally to the required indicator. For 2"–4" 7004 couplings, please use the table below for required torque values.

For 7004 5" and larger, tighten nuts till housings are in metal-to-metal contact.


5

6 Assembly is Complete

Visually inspect the pipe joint to assure the coupling keys are fully engaged in the pipe grooves. For 2"–4" ensure the gaps on each side are evenly space, and for 5" and larger couplings ensure the housings are in firm even metal-to-metal contact on both sides.


6

Specified Bolt Torque

Size	Bolt Size	Torque
In.	In.	Ft.-Lbs
2	5/8	100–130
2½	5/8	100–130
3	5/8	100–130
4	3/4	100–130
5	7/8	*
6	7/8	*
8	1	*
10	1	*
12	1	*

*Torque required to bring housing metal-to-metal contact.

Fig. 7004 with EC® Gasket High Pressure Coupling with End Guard® Gasket

WARNING

Read and understand all instructions before use. Ensure system is drained and depressurized before installation or service. Use appropriate personal protective equipment.

Failure to follow these instructions could result in serious personal injury and/or property damage.

CAUTION: Not using the correct groove dimensions may result in pipe joint separation. Pipe joint separation may result in significant property damage and serious injury.

1 Check & Lubricate Gasket

Check gasket to be sure it is compatible for the intended service. Apply a thin coat of Gruvlok Lubricant to the exterior surface and sealing lips of the gasket. Be careful that foreign particles do not adhere to lubricated surfaces.

2 Gasket & Pipe Installation

Slip the gasket half way on to the pipe end, stop when the center gasket leg comes in contact with the pipe end. Slide the second pipe end half way into the gasket, stopping then the pipe end comes in contact with the center gasket leg. Ensure pipes are aligned properly.

3 Housings

Place each housing halves on the pipe making sure the housing key fits into the groove. Be sure that the tongue and recess portions of the housing mate properly. Insert the bolts and run up the nuts, finger tight.

4 Tighten Nuts

Securely tighten nuts alternately and equally until the housings are in firm metal-to-metal contact.

GRUVLOK
An ASC Engineered Solution

Fig. 7004 with EC® Gasket High Pressure Coupling with End Guard® Gasket (Continued)

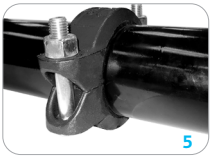
WARNING

Read and understand all instructions before use. Ensure system is drained and depressurized before installation or service. Use appropriate personal protective equipment.

Failure to follow these instructions could result in serious personal injury and/or property damage.

5 Assembly is Complete

Visually inspect the pipe joint to assure the coupling keys are fully engaged in the pipe grooves. Ensure the housings are in firm even metal-to-metal contact on both sides.



Specified Bolt Torque

Size	Bolt Size	Torque
In.	In.	Ft.-Lbs
2	5/8	100–130
2½	5/8	100–130
3	5/8	100–130
4	3/4	130–180
5	7/8	180–220
6	7/8	180–220
8	1	200–250
10	1	200–250
12	1	200–250

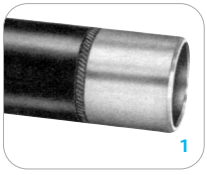
CAUTION: When using an impact wrench, verify that the output of the impact wrench is within the required torque range. Tool output varies and may require trial runs with the use of a torque wrench for accurate assembly.

Sock-It® Fittings

1 Pipe Preparation

Pipe surface shall be cleaned at least 1" from the end of the pipe to remove any coating, indentations, projections, and sharp edges which could affect proper gasket sealing. As a guide for installation, mark the pipe at a distance of 1½" from the end for 1", 1¼", and 1½" size fittings and 1¾" for the 2" & 2½" size fittings.

NOTE: When Allied XL pipe is used it is necessary only to remove sharp edges and burrs at the end of the pipe. No additional cleaning is required.



2 Check Bolts

Check all lock bolts to be sure they do not extend into the I.D. of the Sock-It Fittings as this would prevent proper insertion of the pipe.

3 Lubricate Gaskets

Apply a light coating of GRUVLOK Lubricant to the gaskets located in each end of the Sock-It Fitting. Also apply a light coating of lubricant to the pipe ends to further ease insertion of the pipe into the Sock-It Fitting.

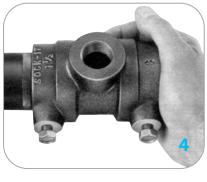
NOTE: Use only Gruvlok Lubricants. Other lubricants may affect gasket performance.

4 Insert Pipe & Tighten Bolts

Insert the prepped and lubricated pipe end into the Sock-It Fitting until the pipe end makes contact with the internal pipe stop. A slight twist while pushing fitting and pipe together will ease the required insertion force. The end of the Sock-It Fitting should be within $^{1}/_{16}$" from the edge of the marking on the pipe. (See Step 1). Rotate the fitting until the desired position is obtained. Tighten the lock bolt until the bolt head bottoms against the threaded boss.

(**NOTE:** The 2½" Sock-It fitting has 2 locking bolts for each pipe end.) Install the other prepped and lubricated pipe end into the Sock-It fitting in the same manner.

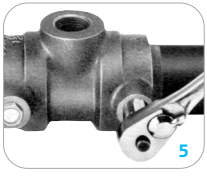
CAUTION: Do NOT hammer fitting on.



5 Assembly is Complete

Sock-It Fittings may be removed by loosening the lock bolts. Reinstallation may be accomplished as described in Steps 1-4. Install the other prepped and lubricated pipe end into the Sock-It fitting in the same manner.

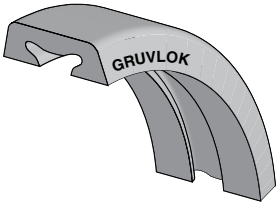
WARNING: System pressure must be relieved and vented, and the system drained of fluid prior to loosening the lock bolts to remove or reposition the Sock-It Fitting. Bolt end must be inspected to assure bolts ability to cut into pipe. Replace bolts in cases where bolt end sharpness has been comprised.



Notes:

Notes:

Gasket Grade & Index Recommendation Index



The lists are provided as an aid in selecting the optimum gasket grade for a specific application to assure the maximum service life.

The recommendations have been developed from current information supplied by manufacturers of the elastomers, technical publications, and industry applications. The information supplied should be considered as a basis for evaluation but not as a guarantee.

Selection of the optimum gasket grade for a specific service requires the consideration of many factors; primarily temperature, fluid concentration, and continuity of service. Unless otherwise noted, all gasket recommendations are based on 100°F (38°C) maximum temperature service condition. Where more than one gasket grade is shown, the preferred grade is listed first.

Combinations of fluids should be referred to an ASC Engineered Solutions Representative for an engineering evaluation and recommendation. In unusual or severe services, gasket materials should be subjected to simulated service conditions to determine the most suitable gasket grade.

Gasket recommendations apply only to Gruvlok gaskets. Contact an ASC Engineered Solutions Representative for recommendations for services not listed. These listings do not apply to Gruvlok Butterfly Valves.

All Gruvlok products marked with UL / ULC Listed, FM approved VdS and / or LPC symbols are Listed / Approved with EPDM material. For other Listed / Approved materials, please contact an ASC Engineered Solutions Representative for more information.

Gasket Grade & Index Recommendation Index (Continued)

Gasket Grade Index – Standard Gasket

Grade	Temp. Range	Compound	Color Code	General Service Applications
EP	-40°F to +250°F (-40°C to 121°C)	EPDM	Green and Red	Water, dilute acids, alkalies, salts, and many chemical services not involving hydrocarbons, oils, or gases. Excellent oxidation resistance. NOT FOR USE WITH HYDROCARBONS
E	-40°F to +230°F (-40°C to 110°C)	EPDM	Green	Water, dilute acids, alkalies, salts, and many chemical services not involving hydrocarbons, oils, or gases. Excellent oxidation resistance. NOT FOR USE WITH HYDROCARBONS
T	-20°F to +180°F (-29°C to 82°C)	Nitrile (Buna-N)	Orange	Petroleum products, vegetable oils, mineral oils, and air contaminated with petroleum oils. NOT FOR USE IN HOT WATER SERVICES

Gasket Grade Index – Special Gasket

Grade	Temp. Range	Compound	Color Code	General Service Applications
0	+20°F to +300°F (-7°C to 149°C)	Fluoro Elastomer	Blue	High temperature resistance to oxidizing acids, petroleum oils, hydraulic fluids, halogenated, hydrocarbons and lubricants
L	--40°F to +350° (-40°C to 177°C)	Silicone	Red Gasket	Dry, hot air and some high temperature chemical services.
E Type A	-40°F to +150°F (-40°C to 66°C)	Pre-Lubricated	Violet	Wet & Dry (oil free air) Pipe in Fire Protection Systems. For dry pipe systems, Gruvlok Xtreme™ Temperature Lubricant is required.

Vacuum Service

Size	Vacuum Level	Gasket Recommendation
1"–12" (25–300mm)	0"–10" Hg	Standard
14"–16" (350–400mm)	0"–10" Hg	Standard
1½"–24" (40–600mm)	0"–29.9" Hg	Flush Gap
2"–8" (50–200mm)	0"–29.9" Hg	SlideLOK

Gasket Recommendation List

Approved Gasket Application – Water & Air

Service	Gasket Grade
Air, (no oil vapors) Temp. -40°F to 230°F (-40°C to 110°C)	E/EP
Air, (no oil vapors) Temp. -40°F to 350°F (-40°C to 177°C)	L
Air, Oil vapor Temp. -20°F to 150°F (-29°C to 66°C)	T
Air, Oil vapor Temp. 20°F to 300°F (-7°C to 149°C)	O
Water, Temp to 150°F (66°C)	E/EP/T
Water, Temp to 230°F (110°C)	E
Water, Acid Mine	E/T
Water, Chlorine	(E/EP/O)
Water, Deionized	E/EP/T
Water, Seawater	E/EP/T
Water, Waste	E/EP/T
Water, Lime	E/EP/T

Where more than one gasket grade is shown the preferred gasket grade is listed first. Where the gasket grade is shown in parentheses, Contact an ASC Engineered Solutions Representative for an engineering evaluation and recommendation. Specify gasket grade when ordering. Use Gruvlok lubricant on gasket. Check gasket color code to be certain it is recommended for the service intended.

Approved Gasket Application – Petrolium Products

Service	Gasket Grade
Crude Oil - Sour	T
Diesel Oil	T
Fuel Oil	T
Gasoline, Leaded	T
Gasoline, Unleaded*	(O)
Hydraulic Oil	T
JP-3, JP-4 and JP-5	T/O
JP-6, 100°F (38°C) Maximum Temp	O
Kerosene	T
Lube Oil, to 150°F (66°C)	T
Motor Oil	T
Natural Gas	T
Tar and Tar Oil	T
Transmission Fluid –Type A	O
Turbo Oil #15 Diester Lubricant	O

Unless otherwise noted, all gasket listings are based upon 100°F (38°C) maximum temperature service conditions.

For services not listed, contact an ASC Representative for recommendation.

*Contact an ASC Representative for service evaluation.

**Extreme caution and care is required when installing Gruvlok couplings on a natural gas system. Must be located in a well ventilated area.

Gruvlok Xtreme Lubricant
Gruvlok Quick Dry Lubricant
Gruvlok Lubricant

Gruvlok Xtreme Lubricant | Gruvlok Quick Dry Lubricant | Gruvlok Lubricant | NSF | Certified to ANSI/NSF 61

Gruvlok Xtreme Lubricant

Gruvlok Xtreme Lubricant has been developed for use with Gruvlok couplings in services where improved lubrication is beneficial. This lubricant has an operating temperature range from -65°F to 400°F (-53.8°C to 204°C), well exceeding the temperature range of Gruvlok gaskets. This lubricant is waterproof, thereby eliminating water wash-out and it will not dry out in the absence of water. There are five primary applications where the Xtreme Lubricant will provide increased benefits: low temperature applications below 32°F (0°C), high temperature applications above 150°F (65.6°C), applications where increased pipe joint flexibility is needed, lubrication of gaskets in copper systems, and for the lubrication of gaskets on HDPE couplings. Since it is formulated from a non-hydro carbon base, it can be used with EPDM, Nitrile and Fluoroelastomer gasket materials. **It is not to be used with Silicone gaskets.**

Material Specifications

In low temperature applications the gasket will shrink, thereby lowering the sealing force on the gasket sealing lips.

The temperature change will also force the gasket to slightly re-position itself. This will cause pipe end sealing surfaces, with small cuts or damage, to become more susceptible to leakage. Gruvlok Xtreme Lubricant will maintain it's lubricating properties.

- At lower temperatures allowing a properly lubricated pipe end and gasket (assembly) to reposition itself during temperature cycles.

Material Specifications

For high temperature service and copper systems, it is required that the gasket be lubricated with a light thin coating on the inside of the gasket. Gruvlok Xtreme lubrication will maintain its lubricating properties at higher temperatures, allowing a properly lubricated pipe end and gasket assembly to re-position itself during temperature cycles. Lubrication of the pipe end and gasket will help the gasket to adjust into the proper sealing position during temperature cycles.

The lubricant on the interior of the gasket will act to improve the chemical resistance of the gasket material by providing a thin lubricant barrier between the piping system fluid and the gasket surface. This is particularly important at higher temperatures where oxidizing agents in the piping system become more aggressive. **However, gasket chemical compatibility must still be considered.**

Gruvlok Lubricants (Continued)

- The Gruvlok Xtreme Lubricant has been formulated from low viscosity, non-petroleum based oils to ease spreading of the lubricant. In applications where pipe movement is expected, proper lubrication of the gasket's exterior assists the gasket into the proper sealing position as pipe system movement occurs. This lubricating film enhances our flexible coupling gasket's ability to compensate for axial, transverse and rotational pipe movements.
- Gruvlok Xtreme Lubricant is the only Gruvlok lubricant that is to be used with Gruvlok couplings and gaskets in HDPE and copper piping systems. It's low temperature capability and lubricity ensure a highly reliable connection.

Gruvlok Xtreme Lubricant is a Teflon® fortified white, tasteless and odorless grease made from Silicone Oil and other ingredients that are safe to ingest. It is sanctioned by the FDA under C.F.R. 21.172.878 & 21.177.1550 (Incidental Food Contact). It is NSF approved for use with potable water.

CAUTION: Silicone based lubricants are not allowed in some facilities. Teflon® is a registered trademark of Dupont.

Gruvlok Quick Dry Lubricant

Gruvlok Quick Dry Lubricant is a fast drying lubricant that has been developed for applications where the piping system is exposed. The service temperature range for this lubricant is from 0° F to 150° F (-17.8°C to 65.6°C) and may be used with all Gruvlok gasket material grades. The lubricant is made from a water emulsion that is non-toxic, it will not impart taste or odor, and does not support bacterial growth. Gruvlok Quick Dry Lubricant is non-corrosive, non-flammable, and is NSF approved for use with potable water.

This lubricant is easy to apply by brush or hand, and it quickly dries to a thin film when in contact with air. It is water-soluble. The quick drying quality of the lubricant eliminates lubricant drips caused by over lubrication. If necessary, reapply lubricant prior to assembly. Do not thin or mix with solvents.

Gruvlok Lubricant

Gruvlok Lubricant is the standard lubricant that has been provided for use with Gruvlok products for years. Gruvlok Lubricant is water soluble, non-toxic, non-corrosive, non-flammable, and will not impart taste or odor. It is NSF approved for use with potable water. This lubricant is acceptable for most applications, however, the Gruvlok Xtreme Lubricant and Gruvlok Quick Dry Lubricant are now available to improve the performance of the couplings and flanges in certain applications.

CAUTION: HDPE pipe requires the use of Gruvlok Xtreme Lubricant and should not be used with Gruvlok Lubricant.

Specified Bolt Torque

Specified bolt torque is for the oval neck track bolts used on Gruvlok couplings and flanges. The nuts must be tightened alternately and evenly until fully tightened.

CAUTION: Proper torquing of coupling bolts is required to obtain specified performance. Over torquing the bolts may result in damage to the bolt and / or casting which could result in pipe joint separation. Under torquing the bolts may result in lower pressure retention capabilities, lower bend load capabilities, joint leakage and pipe joint separation. Pipe joint separation may result in significant property damage and serious injury.

NOTE: Use specified bolt torque unless otherwise indicated on product installation pages.

ANSI Specified Bolt Torque

Bolt Size	Wrench Size	Specified Bolt Torque *
In.	In.	Ft.-Lbs.
3/8	11/16	30–45
1/2	7/8	80–100
5/8	1 1/16	100–130
3/4	1 1/4	130–180
7/8	1 7/16	180–220
1	1 5/8	200–250
1 1/8	1 13/16	225–275
1 1/4	2	250–300

*Non-lubricated bolt torques.

Metric Specified Bolt Torque

Bolt Size	Wrench Size	Specified Bolt Torque *
mm	mm	N-m
M10	16	40–60
M12	22	110–150
M16	24	135–175
M20	30	175–245
M22	34	245–300
M24	36	270–340

*Non-lubricated bolt torques.

GRUVLOK
An ASC Engineered Solution

Pipe Preparation

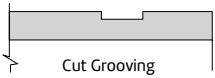
To create a Gruvlok pipe joint, all pipe must be prepared to receive Gruvlok coupling or other Gruvlok pipe system components. The required pipe preparation may be grooving or cleaning the pipe ends, or cutting a hole in the pipe wall.

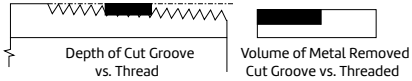
For grooved-end joints, pipe may be grooved by either of two methods; cut or roll grooving. Branch outlet connections require a properly sized and correctly located hole to be cut into the pipe. Sock-it connections require cleaning of the pipe end. Gruvlok plain-end pipe couplings require that the pipe be free of burrs and other sharp projections which could damage the gasket; grooving is not required.

Gruvlok pipe grooving and hole cutting machines are available in a wide variety of designs to meet specific or general requirements. Gruvlok roll grooving machines produce a groove to proper dimensional tolerances, concentric with the pipe O.D., even on out-of-round pipe. Gruvlok hole cutting tools properly center holes for correct assembly of Gruvlok branch outlet components.

Cut-Grooving

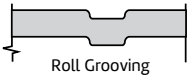
Cut grooving is intended for use with standard and heavier wall pipe. Cut grooving produces a groove in the pipe wall by removing metal from the pipe O.D. The groove removes less than one half of the pipe wall and does not cut as deeply into the pipe wall as do standard pipe threads. The square cut edge of the groove allows for the full expansion, contraction, and deflection capabilities of the Gruvlok coupling.

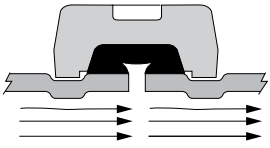




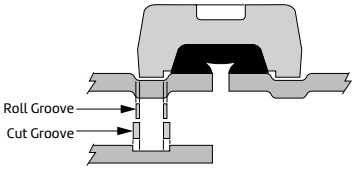
Roll-Grooving

Roll grooving does not remove metal. Instead, metal is displaced while a groove is formed into the outer surface of the pipe wall. The groove configuration has slightly rounded edges resulting in a less flexible joint than a cut groove joint. This reduces available pipe joint movement by 50% over cut grooved coupling joints. Roll grooving is commonly used on a wide range of pipe thicknesses up to 0.375" wall steel pipe and sizes to 24" O.D.





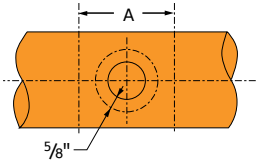
The I.D. "dimple" formed from roll grooving reduces the I.D. (on an average) less than 2%.



Available Movement
Roll Groove vs. Cut Groove

Pipe Preparation (Continued)

Branch Outlet Pipe Clamp-T®



Clamp-T installations require the cutting of a hole through the pipe wall. The hole must be properly sized and located on the centerline of the pipe to assure reliable performance of the Clamp-T gaskets.

After the hole has been cut into the pipe wall, any burrs and sharp or rough edges must be removed from the hole. The outside pipe surfaces within 5/8" of the hole must be clean and smooth. Any scale, projections or indentation which might effect the gasket sealing on the pipe must be removed. The surface around the entire circumference of the pipe within the "A" dimension in the charts must be free from dirt, scale, or projections which might effect the proper assembly of the Clamp-T.

Clamp-T Installation

Branch Size	Hole Dimensions		Surface Prep. "A"
	Hole Saw Size	Max. Perm. Diameter	
DN/mm	In./mm	In./mm	In./mm
½, ¾, 1 15, 20, 25	1½ 38.1	1⅝ 41.3	3½ 88.9
1¼, 1½ 32, 40	2 50.8	2⅛ 54.0	4 101.6
2 50	2½ 63.5	2⅝ 66.7	4½ 114.3
2½ 65	2¾ 69.9	2⅞ 73.0	4¾ 120.7
3 80	3½ 88.9	3⅝ 92.1	5½ 139.7
4 100	4½ 114.3	4⅝ 117.5	6½ 165.1

Sock-It®

For Sock-It Fittings, the pipe ends must be square cut as measured from a true square line.

The maximum allowable tolerance is 0.030" *(0.76mm)* for all sizes. Any sharp edges, burrs, etc. left on the pipe from cutting must be removed. If these are not removed, they may damage the gasket as the pipe is inserted into the Sock-It Fitting.

After cutting, pipe ends must be completely cleaned a minimum of 1" *(25.4mm)* back from the pipe end to remove all pipe coating, weld beads, rust, sharp projections, etc., which might effect gasket sealing integrity.

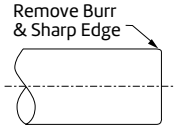
NOTE: When Allied XL pipe is used it is necessary only to remove sharp edges and burrs at the end of the pipe. No additional cleaning is required.

Pipe Tolerances

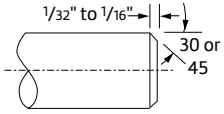
Size	Schedule 10 & 40		Min. O.D.	XL Min. O.D.
	Nom O.D.	Max. O.D.		
DN/mm	In./mm	In./mm	In./mm	In./mm
1 25	1.315 33.4	1.325 33.6	1.295 32.9	1.285 32.6
1¼ 32	1.660 42.2	1.670 42.4	1.642 41.7	1.630 41.4
1½ 40	1.900 48.3	1.910 48.5	1.882 47.8	1.875 47.6
2 50	2.375 60.3	2.385 60.6	2.357 59.9	2.352 59.7
2½ 65	2.875 73.0	2.904 73.8	2.846 72.3	2.837 72.1

Pipe Preparation (Continued)

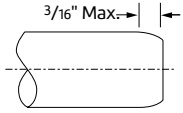
Acceptable Pipe End Configuration



Square cut pipe with O.D. burr & sharp edge removed is preferred configuration.

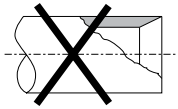


Beveled pipe. Bevel not to exceed 1/16".

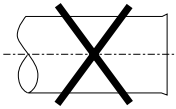


Soft pipe when roll cut may be swaged inward. Swaged portion not to exceed 3/16"

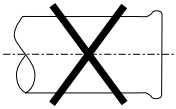
Unacceptable



Excessive chamfer on I.D. will tend to cut gasket during assembly.



Abrasive wheels & saws leave edge burrs especially pronounced on one side.



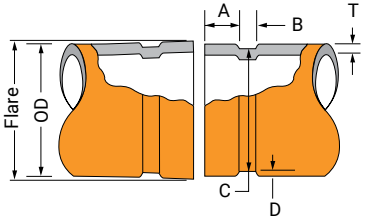
Dull wheel cutter produces a raised ridge at the pipe O.D. giving an oversize diameter.

The sharp O.D. edge left by different methods of cutting pipe **must be removed**. If this sharp edge is not removed, it may damage the gasket as the pipe is inserted into the Sock-It Fitting.

Roughneck®

Plain-End pipe for use with Fig. 7005 Roughneck Couplings must be free of any notches, bumps, weld bead, score marks, etc. for at least 1½" *(38 mm)* back from the pipe end to provide a smooth sealing surface for the gasket. Pipe ends (plain or beveled end) must be square cut as measured from a true square line with the maximum allowable tolerance as follows: 0.030" *(0.7 mm)* for 2" through 3"; 0.045 *(1.1 mm)* for 4" through 6"; and 0.060" *(1.5 mm)* for 8" sizes. The nominal outside diameter of pipe should not vary more than 1% for sizes up to 2½", +1%-1/32" for sizes 3"-5"; +1/16"-1/32" for sizes 6" and larger. Pipe ends must be marked a distance of 1" from the pipe end for Sizes 2"-4" and 1¼" from the pipe end for Sizes 5"-8" as a guide for centering of the gasket on the pipe ends.

Standard Roll Groove Specifications



COLUMN 1 – Nominal IPS Pipe size. Nominal ISO Pipe size.

COLUMN 2 – IPS outside diameter. ISO outside diameter.

COLUMN 3 – Gasket seat must be free from scores, seams, chips, rust or scale which may interfere with proper sealing of the gasket. Gasket seat width (Dimension A) is to be measured from the pipe end to the vertical flank in the groove wall.

COLUMN 4 – Groove width (Dimension B) is to be measured between vertical flank of the groove size walls.

COLUMN 5 – The groove must be of uniform depth around the entire pipe circumference. (See column 6).

COLUMN 6 – Groove depth: for reference only. Groove must conform to the groove diameter "C" listed in column 5.

COLUMN 7 Minimum allowable wall thickness which may be roll grooved.

COLUMN 8 Maximum allowable pipe end flare diameter. Measured at the most extreme pipe end diameter of the gasket seat area.

Out of roundness: Difference between maximum O.D. and minimum O.D. measured at 90° must not exceed total O.D. tolerance listed (reference column 2).

For IPS pipe, the maximum allowable tolerance from square cut ends is 0.03" for 1" thru 3½"; 0.045" for 4" thru 6"; and 0.060" for sizes 8" and above measured from a true square line.

For ISO size pipe, the maximum allowable tolerance from square cut ends is 0.75mm for sizes 25mm- 80mm; 1.15mm for sizes 100mm–150mm; and 1.50mm for sizes 200mm and above, measured from a true square line.

Beveled–End Pipe in conformance with ANSI B16.25 (37½°) is acceptable, however square cut is preferred. Seams must be ground flush with the pipe O.D. and ID prior to roll grooving. Failure to do so may result in damage to the roll grooving machine and unacceptable roll grooves may be produced.

Weld Seams must be ground flush with the pipe O.D. and ID prior to roll grooving. Failure to do so may result in damage to the roll grooving machine and unacceptable roll grooves may be produced.

▼ "A" tolerance +0.030" / -0.060" (+0.77 / -1.54 mm)

Standard Roll Groove Specifications (Continued)

Gruvlok Standard Roll Groove Specification For Steel & Other IPS Or ISO Size Pipe

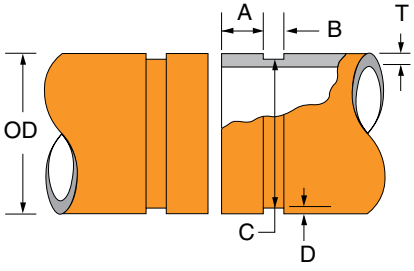
-1-	-2-			-3-	-4-	-5-		-6-	-7-	-8-
Nominal Pipe Size	O.D.			"A" ±0.030/ ±0.76	"B" ±0.030/ ±0.76	"C" Actual	"C" Tol. +0.000	"D" (Ref. Only)	"T" Min. Allow. Wall Thick	Max. Flare Dia.
	Actual	Tolerance								
In./DN(mm)	In./mm	+In./mm	-In./mm	In./mm	In./mm	In./mm	-In./mm	In./mm	In./mm	In./mm
1 25	1.315 33.4	+0.015 +0.38	-0.015 -0.38	0.625 15.88	0.281 7.14	1.190 30.23	-0.015 -0.38	0.063 1.60	0.065 1.7	1.430 36.3
1¼ 32	1.660 42.2	+0.016 +0.41	-0.016 -0.41	0.625 15.88	0.281 7.14	1.535 38.99	-0.015 -0.38	0.063 1.60	0.065 1.7	1.770 45.0
1½ 40	1.900 48.3	+0.019 +0.48	-0.019 -0.48	0.625 15.88	0.281 7.14	1.775 45.09	-0.015 -0.38	0.063 1.60	0.065 1.7	2.010 51.1
2 50	2.375 60.3	+0.024 +0.61	-0.024 -0.61	0.625 15.88	0.344 8.74	2.250 57.15	-0.015 -0.38	0.063 1.60	0.065 1.7	2.480 63.0
2½ 65	2.875 73.0	+0.029 +0.74	-0.029 -0.74	0.625 15.88	0.344 8.74	2.720 69.09	-0.018 -0.46	0.078 1.98	0.083 2.1	2.980 75.7
3 O.D. 76.1	2.996 76.1	+0.030 +0.76	-0.030 -0.76	0.625 15.88	0.344 8.74	2.845 72.26	-0.018 -0.46	0.076 1.93	0.083 2.1	3.100 78.7
3 80	3.500 88.9	+0.035 +0.89	-0.031 -0.79	0.625 15.88	0.344 8.74	3.344 84.94	-0.018 -0.46	0.078 1.98	0.083 2.1	3.600 91.4
3½ 90	4.000 101.6	+0.040 +1.02	-0.031 -0.79	0.625 15.88	0.344 8.74	3.834 97.38	-0.020 -0.51	0.083 2.11	0.083 2.1	4.100 104.1
4¼ O.D. 108.0	4.250 108.0	+0.042 +1.07	-0.031 -0.79	0.625 15.88	0.344 8.74	4.084 103.73	-0.020 -0.51	0.083 2.11	0.083 2.1	4.350 110.5
4 100	4.500 114.3	+0.045 +1.14	-0.031 -0.79	0.625 15.88	0.344 8.74	4.334 110.08	-0.020 -0.51	0.083 2.11	0.083 2.1	4.600 116.8
5¼ O.D. 133.0	5.236 133.0	+0.052 +1.32	-0.031 -0.79	0.625 15.88	0.344 8.74	5.084 129.13	-0.020 -0.51	0.076 1.93	0.109 2.8	5.350 135.9
5½ O.D. 139.7	5.500 139.7	+0.055 +1.40	-0.031 -0.79	0.625 15.88	0.344 8.74	5.334 135.48	-0.020 -0.51	0.083 2.11	0.109 2.8	5.600 142.2
5 125	5.563 141.3	+0.056 +1.42	-0.031 -0.79	0.625 15.88	0.344 8.74	5.395 137.03	-0.022 -0.56	0.084 2.13	0.109 2.8	5.660 143.8

Standard Roll Groove Specifications (Continued)

Gruvlok Standard Roll Groove Specification For Steel & Other IPS Or ISO Size Pipe

-1-	-2-			-3-	-4-	-5-		-6-	-7-	-8-
Nominal Pipe Size	O.D.			"A" ±0.030/ ±0.76	"B" ±0.030/ ±0.76	"C" Actual	"C" Tol. +0.000	"D" (Ref. Only)	"T" Min. Allow. Wall Thick	Max. Flare Dia.
	Actual	Tolerance								
In./DN(mm)	In./mm	+In./mm	-In./mm	In./mm	In./mm	In./mm	-In./mm	In./mm	In./mm	In./mm
6¼ O.D. 159.0	6.259 159.0	+0.063 +1.60	-0.031 -0.79	0.625 15.88	0.344 8.74	6.084 154.53	-0.022 -0.56	0.088 2.24	0.109 2.8	6.350 161.3
6½ O.D. 165.1	6.500 165.1	+0.063 +1.60	-0.031 -0.79	0.625 15.88	0.344 8.74	6.334 160.88	-0.022 -0.56	0.085 2.16	0.109 2.8	6.600 167.6
6 150	6.625 168.3	+0.063 +1.60	-0.031 -0.79	0.625 15.88	0.344 8.74	6.455 163.96	-0.022 -0.56	0.085 2.16	0.109 2.8	6.730 170.9
8 200	8.625 219.1	+0.063 +1.60	-0.031 -0.79	0.750 19.05	0.469 11.91	8.441 214.40	-0.025 -0.64	0.092 2.34	0.109 2.8	8.800 223.5
10 250	10.750 273.1	+0.063 +1.60	-0.031 -0.79	0.750 19.05	0.469 11.91	10.562 268.27	-0.027 -0.69	0.094 2.39	0.134 3.4	10.920 277.4
12 300	12.750 323.9	+0.063 +1.60	-0.031 -0.79	0.750 19.05	0.469 11.91	12.531 318.29	-0.030 -0.76	0.109 2.77	0.156 4.0	12.920 328.2
14 O.D. 355.6	14.000 355.6	+0.063 +1.60	-0.031 -0.79	0.938 23.83	0.469 11.91	13.781 350.04	-0.030 -0.76	0.109 2.77	0.156 4.0	14.100 358.1
16 O.D. 406.4	16.000 406.4	+0.063 +1.60	-0.031 -0.79	0.938 23.83	0.469 11.91	15.781 400.84	-0.030 -0.76	0.109 2.77	0.165 4.2	16.100 408.9
18 O.D. 457.2	18.000 457.2	+0.063 +1.60	-0.031 -0.79	1.000 25.40	0.469 11.91	17.781 451.64	-0.030 -0.76	0.109 2.77	0.165 4.2	18.160 461.3
20 O.D. 508.0	20.000 508.0	+0.063 +1.60	-0.031 -0.79	1.000 25.40	0.469 11.91	19.781 502.44	-0.030 -0.76	0.109 2.77	0.188 4.8	20.160 512.1
24 O.D. 609.6	24.000 609.6	+0.063 +1.60	-0.031 -0.79	1.000 25.40	0.500 12.70	23.656 600.86	-0.030 -0.76	0.172 4.37	0.218 5.5	24.200 614.7
30 O.D. 762.0	30.000 762.0	+0.093 2.36	-0.031 0.79	1.750 ▼ 44.45	0.625 15.88	29.500 749.30	-0.063 1.60	0.250 6.35	0.250 6.35	30.200 761.1

Cut Groove Specifications



COLUMN 1 – Nominal IPS Pipe size. Nominal ISO Pipe size.

COLUMN 2 – IPS outside diameter. ISO outside diameter.

COLUMN 3 & 4 – Gasket seat must be free from scores, seams, chips, rust or scale which may interfere with proper coupling assembly.

COLUMN 5 – The groove must be of uniform depth around the entire pipe circumference. (See column 6).

COLUMN 5 – The groove must be of uniform depth around the entire pipe circumference. (See column 6).

COLUMN 6 – he groove must be of uniform depth around the entire pipe circumference. (See column 6).

COLUMN 7 – Minimum allowable wall thickness which may be cut grooved.

Out of roundness: Difference between maximum O.D. and minimum O.D. measured at 90° must not exceed total O.D. tolerance listed.

For IPS pipe, the maximum allowable tolerance from square cut ends is 0.03" for 1" thru 3½"; 0.045" for 4" thru 6"; and 0.060" for sizes 8" and above measured from a true square line.

For ISO size pipe, the maximum allowable tolerance from square cut ends is 0.75mm for sizes 25mm–80mm; 1.15mm for sizes 100mm– 150mm; and 1.50mm for sizes 200mm and above, measured from a true square line.

Beveled–End Pipe in conformance with ANSI B16.25 (37½°) is acceptable, however square cut is preferred.

Not to be used with End Guard gaskets.

▼ "A" tolerance +0.030" / –0.060" (+0.77 / –1.54 mm)

Cut Groove Specifications (Continued)

Gruvlok Standard Cut Groove Specifications for Steel & Other IPS OR ISO Size Pipe

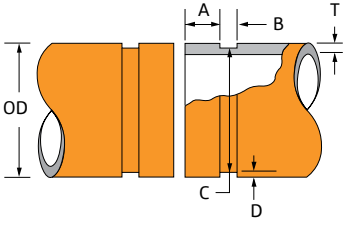
-1-	-2-			-3-	-4-	-5-		-6-	-7-
Nom. IPS Pipe Size	O.D.			Gasket Seat "A" ±0.030 ±0.76	Groove Width "B" ±0.030 ±0.76	Groove Diameter "C"		Actual Groove Depth "D" (Ref. Only)	Min. Allow. Wall Thick. "T"
	Actual	Tolerance				Actual	Tol. +0.000		
In./DN (mm)	In./mm	+In./mm	-In./mm	In./mm	In./mm	In./mm	-In./mm	In./mm	In./mm
1 25	1.315 33.4	+0.015 +0.38	-0.015 -0.38	0.625 15.88	0.312 7.92	1.190 30.23	-0.015 -0.38	0.062 1.6	0.133 3.4
1¼ 32	1.660 42.2	+0.016 +0.41	-0.016 -0.41	0.625 15.88	0.312 7.92	1.535 38.99	-0.015 -0.38	0.062 1.6	0.140 3.6
1½ 40	1.900 48.3	+0.019 +0.48	-0.019 -0.48	0.625 15.88	0.312 7.92	1.775 45.09	-0.015 -0.38	0.062 1.6	0.145 3.7
2 50	2.375 60.3	+0.024 +0.61	-0.024 -0.61	0.625 15.88	0.312 7.92	2.250 57.15	-0.015 -0.38	0.062 1.6	0.154 3.9
2½ 65	2.875 73.0	+0.029 +0.74	-0.029 -0.74	0.625 15.88	0.312 7.92	2.720 69.09	-0.018 -0.46	0.078 2.0	0.187 4.8
3 O.D. 76.1	2.996 76.1	+0.030 +0.76	-0.030 -0.76	0.625 15.88	0.312 7.92	2.845 72.26	-0.018 -0.46	0.076 1.9	0.188 4.8
3 80	3.500 88.9	+0.035 +0.89	-0.031 -0.79	0.625 15.88	0.312 7.92	3.344 84.94	-0.018 -0.46	0.078 2.0	0.188 4.8
3½ 90	4.000 101.6	+0.040 +1.02	-0.031 -0.79	0.625 15.88	0.312 7.92	3.834 97.38	-0.020 -0.51	0.083 2.1	0.188 4.8
4¼ O.D. 108.0	4.250 108.0	+0.042 +1.07	-0.031 -0.79	0.625 15.88	0.375 9.53	4.084 103.73	-0.020 -0.51	0.083 2.1	0.203 5.2
4 100	4.500 114.3	+0.045 +1.14	-0.031 -0.79	0.625 15.88	0.375 9.53	4.334 110.08	-0.020 -0.51	0.083 2.1	0.203 5.2
5¼ O.D. 133.0	5.236 133.0	+0.052 +1.32	-0.031 -0.79	0.625 15.88	0.375 9.53	5.084 129.13	-0.020 -0.51	0.076 1.9	0.203 5.2
5½ O.D. 139.7	5.500 139.7	+0.055 +1.40	-0.031 -0.79	0.625 15.88	0.375 9.53	5.334 135.48	-0.020 -0.51	0.083 2.1	0.203 5.2
5 125	5.563 141.3	+0.056 +1.42	-0.031 -0.79	0.625 15.88	0.375 9.53	5.395 137.03	-0.022 -0.56	0.084 2.1	0.203 5.2
6¼ O.D. 159.0	6.259 159.0	+0.063 +1.60	-0.031 -0.79	0.625 15.88	0.375 9.53	6.084 154.53	-0.022 -0.56	0.088 2.2	0.249 6.3
6½ O.D. 165.1	6.500 165.1	+0.063 +1.60	-0.031 -0.79	0.625 15.88	0.375 9.53	6.334 160.88	-0.022 -0.56	0.085 2.2	0.219 5.6
6 150	6.625 168.3	+0.063 +1.60	-0.031 -0.79	0.625 15.88	0.375 9.53	6.455 163.96	-0.022 -0.56	0.085 2.2	0.219 5.6

Cut Groove Specifications (Continued)

Gruvlok Standard Cut Groove Specifications for Steel & Other IPS OR ISO Size Pipe

-1-	-2-			-3-	-4-	-5-		-6-	-7-
Nom. IPS Pipe Size	O.D.			Gasket Seat "A" ±0.030 ±0.76	Groove Width "B" ±0.030 ±0.76	Groove Diameter "C"		Actual Groove Depth "D" (Ref. Only)	Min. Allow. Wall Thick. "T"
	Actual	Tolerance				Actual	Tol. +0.000		
In./DN (mm)	In./mm	+In./mm	-In./mm	In./mm	In./mm	In./mm	-In./mm	In./mm	In./mm
8 200	8.625 219.1	+0.063 +1.60	-0.031 -0.79	0.750 19.05	0.437 11.10	8.441 214.40	-0.025 -0.64	0.092 2.3	0.238 6.1
10 250	10.750 273.1	+0.063 +1.60	-0.031 -0.79	0.750 19.05	0.500 12.70	10.562 268.27	-0.027 -0.69	0.094 2.4	0.250 6.4
12 300	12.750 323.9	+0.063 +1.60	-0.031 -0.79	0.750 19.05	0.500 12.70	12.531 318.29	-0.030 -0.76	0.109 2.8	0.279 7.1
14 O.D. 355.6	14.000 355.6	+0.063 +1.60	-0.031 -0.79	0.938 23.83	0.500 12.70	13.781 350.04	-0.030 -0.76	0.109 2.8	0.281 7.1
16 O.D. 406.4	16.000 406.4	+0.063 +1.60	-0.031 -0.79	0.938 23.83	0.500 12.70	15.781 400.84	-0.030 -0.76	0.109 2.8	0.312 7.9
18 O.D. 457.2	18.000 457.2	+0.063 +1.60	-0.031 -0.79	1.000 25.40	0.500 12.70	17.781 451.64	-0.030 -0.76	0.109 2.8	0.312 7.9
20 O.D. 508.0	20.000 508.0	+0.063 +1.60	-0.031 -0.79	1.000 25.40	0.500 12.70	19.781 502.44	-0.030 -0.76	0.109 2.8	0.312 7.9
24 O.D. 609.6	24.000 609.6	+0.063 +1.60	-0.031 -0.79	1.000 25.40	0.563 14.30	23.656 600.86	-0.030 -0.76	0.172 4.4	0.375 9.5
28 I.D. 733.4	28.875 733.4	+0.063 +1.60	-0.031 -0.79	1.000 25.40	0.563 14.30	28.531 724.69	-0.030 -0.76	0.172 4.4	0.437 11.1
30 I.D. 787.4	31.000 787.4	+0.063 +1.60	-0.031 -0.79	1.250 31.750	0.625 15.88	30.594 777.09	-0.030 -0.76	0.203 5.2	0.500 12.7
30 O.D. 762.0	30.000 762.0	+0.093 2.36	-0.031 0.79	1.750▼ 44.45	0.625 15.88	29.500 749.30	0.063 1.60	0.250 6.35	0.500 12.7

End Guard® Cut Groove Specifications



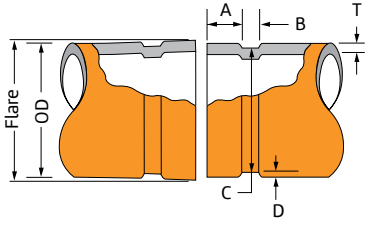
End Guard (EG) cut groove is designed for standard or heavier wall thickness pipe to be joined by HPR 7004 EG couplings. Gruvlok EG fittings are grooved in accordance with these dimensions.

End Guard (EG) Cut Groove Specifications*

Nominal IPS Pipe Size	Pipe Outside Diameter			Gasket Seat "A"		Groove Width "B"		Groove Dia. "C"		Groove Depth (Ref. Only) "D"	Min. Allow. Wall Thick. "T"
	Actual	Tolerance		Actual	Tol.+/-	Actual	Tol. (+0.010)	Actual	Tol.		
In./DN (mm)	In./mm	+In./mm	-In./mm	In./mm	In./mm	In./mm	-In./mm	In./mm	In./mm	In./mm	In./mm
2 50	2.375 60.3	+0.024 +0.61	-0.024 -0.61	0.562 14.27	+0.010 0.25	0.255 6.48	-0.005 -0.13	2.250 57.15	-0.015 -0.38	0.062 1.6	0.154 4.0
2½ 65	2.875 73.0	+0.029 +0.74	-0.029 -0.74	0.562 14.27	+0.010 0.25	0.255 6.48	-0.005 -0.13	2.720 69.09	-0.018 -0.46	0.078 2.0	0.188 4.8
3 80	3.500 88.9	+0.035 +0.89	-0.031 -0.79	0.562 14.27	+0.010 0.25	0.255 6.48	-0.005 -0.13	3.344 84.94	-0.018 -0.46	0.078 2.0	0.188 4.8
4 100	4.500 114.3	+0.045 +1.14	-0.031 -0.79	0.605 15.37	+0.015 0.38	0.305 7.75	-0.005 -0.13	4.334 110.08	-0.020 -0.51	0.083 2.1	0.203 5.2
5 125	5.563 141.3	+0.056 +1.42	-0.031 -0.79	0.605 15.37	+0.015 0.38	0.305 7.75	-0.005 -0.13	5.395 137.03	-0.022 -0.56	0.084 2.1	0.203 5.2
6 150	6.625 168.3	+0.063 +1.60	-0.031 -0.79	0.605 15.37	+0.015 0.38	0.305 7.75	-0.005 -0.13	6.455 163.96	-0.022 -0.56	0.085 2.2	0.219 5.6
8 200	8.625 219.1	+0.063 +1.60	-0.031 -0.79	0.714 18.14	+0.015 0.38	0.400 10.16	-0.010 -0.254	8.441 214.40	-0.025 -0.64	0.092 2.3	0.238 6.1
10 250	10.750 273.1	+0.063 +1.60	-0.031 -0.79	0.714 18.14	+0.015 0.38	0.400 10.16	-0.010 -0.25	10.562 268.27	-0.027 -0.69	0.094 2.4	0.250 6.4
12 300	12.750 323.9	+0.063 +1.60	-0.031 -0.79	0.714 18.14	+0.015 0.38	0.400 10.16	-0.010 -0.25	12.531 318.29	-0.030 -0.76	0.109 2.8	0.279 7.1

*Refer to additional notes on page 57.

End Guard® Roll Groove Specifications



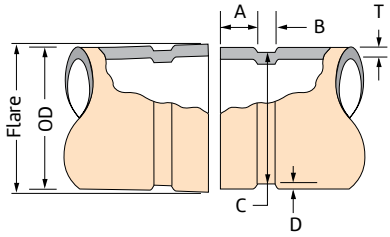
End Guard (EG) roll groove is designed for lightwall pipe to be joined by HPR 7004 EG couplings.

End Guard (EG) Roll Groove Specifications*

Nominal IPS Pipe Size	Pipe Outside Diameter			Gasket Seat "A"		Groove Width "B"		Groove Dia. "C"		Groove Depth (Ref. Only) "D"	Min. Allow. Wall Thick. "T"
	Actual	Tolerance		Actual	Tol.+/-	Actual	Tol. (+0.010)	Actual	Tol.		
In./DN (mm)	In./mm	+In./mm	-In./mm	In./mm	In./mm	In./mm	-In./mm	In./mm	In./mm	In./mm	In./mm
2 50	2.375 60.3	+0.024 +0.61	-0.024 -0.61	0.572 +14.53	-0.020 -0.51	0.250 6.35	+0.015 0.38	2.250 57.15	-0.015 -0.38	0.062 1.6	0.065 1.7
2½ 65	2.875 73.0	+0.029 +0.74	-0.029 -0.74	0.572 +14.53	-0.020 -0.51	0.250 6.35	+0.015 0.38	2.720 69.09	-0.018 -0.46	0.078 2.0	0.083 2.1
3 80	3.500 88.9	+0.035 +0.89	-0.031 -0.79	0.572 +14.53	-0.020 -0.51	0.250 6.35	+0.015 0.38	3.344 84.94	-0.018 -0.46	0.078 2.0	0.083 2.1
4 100	4.500 114.3	+0.045 +1.14	-0.031 -0.79	0.610 +15.49	-0.020 -0.51	0.300 7.62	+0.020 0.51	4.334 110.08	-0.020 -0.51	0.083 2.1	0.083 2.1
5 125	5.563 141.3	+0.056 +1.42	-0.031 -0.79	0.610 +15.49	-0.020 -0.51	0.300 7.62	+0.020 0.51	5.395 137.03	-0.022 -0.56	0.084 2.1	0.109 2.8
6 150	6.625 168.3	+0.063 +1.60	-0.031 -0.79	0.610 +15.49	-0.020 -0.51	0.300 7.62	+0.020 0.51	6.455 163.96	-0.022 -0.56	0.085 2.2	0.109 2.8
8 200	8.625 219.1	+0.063 +1.60	-0.031 -0.79	0.719 +18.26	-0.020 -0.51	0.390 9.91	+0.020 0.51	8.441 214.40	-0.025 -0.64	0.092 2.3	0.109 2.8
10 250	10.750 273.1	+0.063 +1.60	-0.031 -0.79	0.719 +18.26	-0.020 -0.51	0.390 9.91	+0.020 0.51	10.562 268.27	-0.027 -0.69	0.094 2.4	0.134 3.4
12 300	12.750 323.9	+0.063 +1.60	-0.031 -0.79	0.719 +18.26	-0.020 -0.51	0.390 9.91	+0.020 0.51	12.531 318.29	-0.030 -0.76	0.109 2.8	0.156 4.0

*Refer to additional notes on page 57.

CTS Copper System – Roll Groove Specifications



Gruvlok CTS Copper System – Roll Groove Specifications

-1-	-2-			-3-	-4-	-5-		-6-	-7-	-8-
Nominal Size	Tubing Outside Diameter			Gasket Seat "A" +/– 0.03 in. +/– 0.76 mm	Groove Width "B" +0.03/–0.00 in. +0.76/–0.00mm	Groove Diameter "C"		Nominal Groove Depth "D"	Min. Wall "T"	Max. Flare Diam.
	Actual	Tolerance				Actual	Tol. +0.000			
In.	In./mm	+ In./mm	– In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm
2	2.125 54.0	0.002 0.05	0.002 0.05	0.610 15.5	0.300 7.6	2.029 51.54	-0.020 -0.51	0.048 1.2	0.058 1.6	2.220 56.4
2½	2.625 66.7	0.002 0.05	0.002 0.05	0.610 15.5	0.300 7.6	2.525 64.14	-0.020 -0.51	0.050 1.3	0.065 1.7	2.720 69.1
3	3.125 79.4	0.002 0.05	0.002 0.05	0.610 15.5	0.300 7.6	3.025 76.84	-0.020 -0.51	0.050 1.3	DWV	3.220 81.8
4	4.125 104.8	0.002 0.05	0.002 0.05	0.610 15.5	0.300 7.6	4.019 102.08	-0.020 -0.51	0.053 1.3	DWV	4.220 107.2
5	5.125 130.2	0.002 0.05	0.002 0.05	0.610 15.5	0.300 7.6	4.999 126.97	-0.020 -0.51	0.053 1.3	DWV	5.220 132.6
6	6.125 155.6	0.002 0.05	0.002 0.05	0.610 15.5	0.300 7.6	5.999 152.37	-0.020 -0.51	0.063 1.6	DWV	6.220 158.0
8	8.125 206.4	0.002 0.05	0.004 0.10	0.610 15.5	0.300 7.6	7.959 202.16	-0.020 -0.51	0.083 2.1	DWV	8.220 208.8

CTS Copper System (Continued)

COLUMN 1 – Nominal tubing size ASTM B88

COLUMN 2 – Outside diameter of copper tubing per ASTM B88. Allowable tolerance from square cut ends is 0.030"/0.76mm for sizes 2"-3"; 0.045"/1.14mm for sizes 4-8".

COLUMN 3– Gasket seat must be free from scores, roll marks, indentations, grease and dirt which may interfere with gasket sealing.

COLUMN 4 – Groove width is to be free from chips, dirt, etc. which may interfere with proper coupling assembly.

COLUMN 5 – Groove diameter must be of uniform depth for the entire circumference of the tubing. See column 6.

COLUMN 6 – Groove depth is for reference only; the groove diameter must conform to column 5.

COLUMN 7 – DWV (Drain, Waste and Vent Piping) per ASTM B306.

COLUMN 8 – Maximum flare diameter is the OD at the most extreme tubing diameter.

Double Cut Groove Specifications

COLUMN 1 – Nominal IPS Pipe size. Nominal ISO Pipe size.

COLUMN 2 – IPS outside diameter. ISO outside diameter.

COLUMN 3, 4 & 5 – Gasket seat must be free from scores, seams, chips, rust or scale which may interfere with proper coupling assembly.

COLUMN 6 – The groove must be of uniform depth around the entire pipe circumference. (See column 7).

COLUMN 7 – Groove depth: for reference only. Groove must conform to the groove diameter "C" listed in column 6.

COLUMN 8 – Minimum allowable bolt torque required for complete assembly.

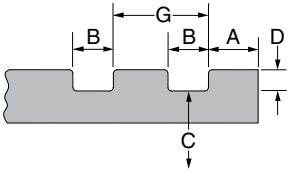
Out of roundness: Difference between maximum O.D. and minimum O.D. measured at 90° must not exceed total O.D. tolerance listed.

For IPS pipe, the maximum allowable tolerance from square cut ends is 0.03" for 1" thru 3½"; 0.045" for 4" thru 6"; and 0.060" for sizes 8" and above measuredfrom a true square line.

For ISO size pipe, the maximum allowable tolerance from square cut ends is 0.75mm for sizes 25mm-80mm; 1.15mm for sizes 100mm- 150mm; and 1.50mm for sizes 200mm and above, measured from a true square line.

Beveled-End Pipe in conformance with ANSI B16.25 (37½°) is acceptable, however square cut is preferred.

Double Cut Groove Specifications (Continued)



Gruvlok Standard Double Cut Groove Specification For Steel & Other IPS Or ISO Size Pipe

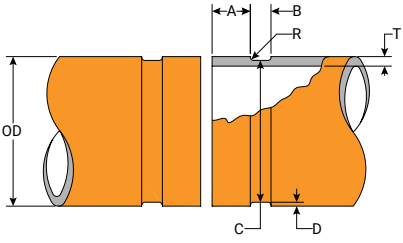
-1-	-2-			-3-	-4-	-5-	-6-		-7-	-8-
Nominal IPS Pipe Size	O.D.			Gasket Seat "A" ±0.030/ ±0.76	Groove Sep "G" ±0.005/ ±0.127	Groove Width "B" ±0.030/ ±0.76	Groove Diameter "C"		Actual Groove Depth "D" (Ref. Only)	Min. Allowable Bolt Torque Required for Assembly
	Actual	Tolerance					Actual	Tol. +0.000		
In./DN(mm)	In./mm	+In./mm	-In./mm	In./mm	In./mm	In./mm	In./mm	-In./mm	In./mm	Ft.-Lbs./N-m
6 150	6.625 168.3	+0.063 +1.60	-0.031 -0.79	0.625 15.88	0.785 20.0	0.375 9.53	6.340 161.0	-0.022 -0.56	0.142 3.6	450 610.2
8 200	8.625 219.1	+0.063 +1.60	-0.031 -0.79	0.750 19.05	0.855 21.7	0.500 12.70	8.240 209.3	-0.022 -0.56	0.192 4.9	500 678.0
10 250	10.750 273.1	+0.063 +1.60	-0.031 -0.79	0.750 19.05	0.855 21.7	0.500 12.70	10.350 262.9	-0.022 -0.56	0.200 5.1	500 678.0

Gruvlok "End Guard" Double Cut Groove Specification For Steel & Other Ips Or Iso Size Pipe

-1-	-2-			-3-	-4-	-5-	-6-		-7-	-8-
Nominal IPS Pipe Size	O.D.			Gasket Seat "A" ±0.030/ ±0.76	Groove Sep "G" ±0.005/ ±0.127	Groove Width "B" ±0.030/ ±0.76	Groove Diameter "C"		Actual Groove Depth "D" (Ref. Only)	Min. Allowable Bolt Torque Required for Assembly
	Actual	Tolerance					Actual	Tol. +0.000		
In./DN(mm)	In./mm	+In./mm	-In./mm	In./mm	In./mm	In./mm	In./mm	-In./mm	In./mm	Ft.-Lbs./N-m
6 150	6.625 168.3	+0.063 +1.60	-0.031 -0.79	0.605 15.4	0.785 20.0	0.375 9.53	6.340 161.0	-0.022 -0.56	0.142 3.6	450 610.2
8 200	8.625 219.1	+0.063 +1.60	-0.031 -0.79	0.714 18.1	0.855 21.7	0.500 12.70	8.240 209.3	-0.022 -0.56	0.192 4.9	500 678.0
10 250	10.750 273.1	+0.063 +1.60	-0.031 -0.79	0.714 18.1	0.855 21.7	0.500 12.70	10.350 262.9	-0.022 -0.56	0.200 5.1	500 678.0

CPVC Cut Groove Specifications

CPVC Cut Groove is designed for use on Schedule 80 CPVC Corzan Pipe (ASTM F441).



CPVC Cut Groove Specifications

Nominal Pipe Size	Pipe Outside Diameter			Gasket Seat "A" ±0.03/ ± 0.76	Groove Width "B" ±0.030/ ±0.76	Groove Diameter "C"		Actual Groove Depth "D" (Ref Only)	Min. Allow Wall Thick. "T"	Groove Radius "R"
	Actual	Tolerance				Actual	Tol. +0.000			
In./DN	In./mm	+ In./mm	− In./mm	In./mm	In./mm	In./mm	− In./mm	In./mm	In./mm	In./mm
2 50	2.375 60.3	+0.006 +0.15	-0.006 -0.15	0.625 15.8	0.312 7.92	2.250 57.15	-0.015 -0.38	0.062 1.6	0.218 5.54	0.045 1.14
2½ 65	2.875 72.0	+0.007 +0.18	-0.007 -0.18	0.625 15.8	0.312 7.92	2.720 69.09	-0.018 -0.46	0.078 2.0	0.276 7.01	0.045 1.14
3 80	3.500 88.9	+0.008 +0.20	-0.008 -0.20	0.625 15.8	0.312 7.92	3.344 84.94	-0.018 -0.46	0.078 2.0	0.300 7.62	0.045 1.14
4 100	4.500 114.3	+0.009 +0.23	-0.009 -0.23	0.625 15.8	0.375 9.53	4.334 110.08	-0.020 -0.51	0.083 2.2	0.337 8.56	0.045 1.14
6 150	6.625 168.3	+0.011 +0.28	-0.011 -0.28	0.625 15.8	0.375 9.53	6.455 163.96	-0.022 -0.56	0.085 2.2	0.432 10.97	0.045 1.14
8 200	8.625 219.1	+0.015 +0.38	-0.015 -0.38	0.750 19.05	0.437 11.10	8.441 214.40	-0.025 -0.64	0.092 2.3	0.500 12.70	0.078 1.98

Notes:
1. ASC Recommended Groover: Rex Wheeler 6950 Plastic Cut Groover.
2. CPVC pipe manufactured per ASTM F441. Minimum cell class "23447" per ASTM D1784.

Gruvlok Couplings — **Design Factors**

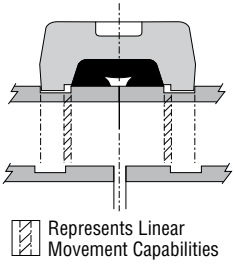
Movement

Each flexible design Gruvlok coupling can provide for pipe system movement up to the design maximum for the specific size and type coupling being utilized. Movement is possible in the Gruvlok coupling due to two factors: (1) designed-in clearance between the key of the coupling and the groove diameter and groove width, and (2) the gap between pipe ends joined by the coupling.

Linear Movement

Flexible Coupling Linear Movement:

Linear movement is accommodated within the couplig by allowing the pipe ends to move together or apart in response to pressure thrusts and temperature changes. The available linear movement provided by Standard Gruvlok couplings is shown below:



Linear Movement		
Sizes	Roll Groove Pipe	Cut Groove Pipe
1"–3½"	1/32"	1/16"
4"–24"	3/32"	3/16"

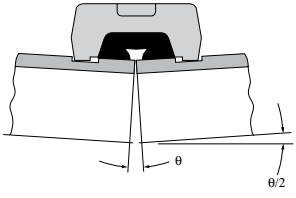
Rigid Couplings

Gruvlok rigid couplings Fig. 7400, Fig. 7401 and Fig. 7004 HPR are designed to provide a joint with the attributes of a welded or flanged connection. Therefore, these joints would remain in strict alignment and would resist deflection and linear movement during service.

Angular Movement

Flexible Coupling Angular Movement

Designed-in clearances allow limited deflection of the pipe joint within the coupling, without introducing eccentric loads into the coupling joint.



The maximum available angular movement of Gruvlok flexible couplings on roll groove joints is shown in the performance data for each coupling. The amount of angular flexibility varies for each coupling size and type. The values account for pipe, groove, and coupling tolerances.

Flexible Couplings

Figs. 7000, 7001, 7003, 7010 are the flexible couplings provided in the Gruvlok product line. The following information on movement applies to these flexible couplings.

Gruvlok Couplings — **Movement Applications**

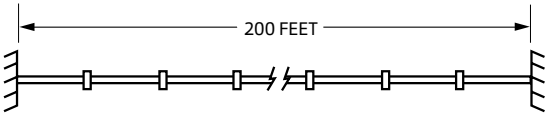
Thermal Movement

A sufficient amount of coupling joints must be provided to accommodate the calculated movement (expansion or contraction) in a pipe run or segment thereof.

Example:

A 200 foot long straight run of 4" steel cut grooved pipe between anchor points. Minimum Temperature: 40° F (4.4° C) (at time of installation).

Maximum Oper Temperature: 160° F (71.1° C).



Thermal expansion tables show this system will expand a total of 1.80" due to the temperature change.

Design Question

How many couplings are required to account for the thermal growth?

Available Linear Movement per Flexible Coupling:

Using the table on page 66, we see that there is 0.188" linear movement per coupling (4" Flexible Coupling)

Couplings Required

As indicated above, the total movement is 1.80". Thus, the number of couplings is determined as follows:

No. of Couplings = Tot. Movement / Avail. Movement per Coupling

For Our Example:

No . of Couplings = (1.80") / (0.187") = 9.6,
Therefore 10 couplings are needed

Position of Couplings

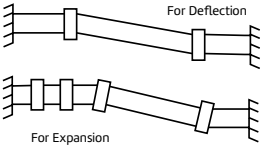
In order for the couplings to provide for the movement indicated by the above example, it would be necessary to install all couplings with the maximum gap between pipe ends. Conversely, if the thermal movement was contraction due to a reduction of system temperature, the coupling joints would have be installed with the pipe ends butted, thus accommodating the "shrink" of the pipe system.

Combined Linear & Angular Movement

The clearance in the grooved coupling joint, will allow a limited capability for combined linear and angular movement. A partially deflected joint will not provide full linear movement capability. A fully deflected coupling joint provides no linear movement capability. The Gruvlok coupling will not allow for both maximum linear and maximum angular movement simultaneously.

In systems where both are expected, additional joints may be required.

Gruvlok Couplings — **Movement Applications** (Continued)



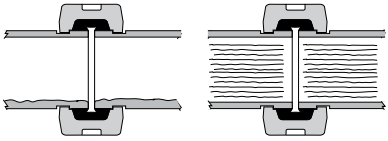
Note: Fully deflected joint will not allow for linear expansion.

In the example above, two couplings were added to account for thermal expansion and the other couplings accommodate only the misalignment. The additional stress from the combined movement is therefore relieved.

Rotational Movement

Piping systems designed with Gruvlok Couplings can accommodate minor rotational movement from thermal expansion, settlement, vibration, or other similar movements. However, Gruvlok Couplings **should never be used as a continuous swivel joint**.

Example:



Before Pipe Rotation After Pipe Rotation

Utilizing the rotational capability of the Gruvlok Coupling, the pipe life of a slurry or similar coarse material piping system can be extended.

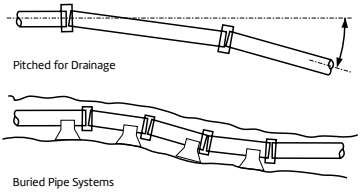
For pipe rotation, the system must be shut down and internal pressure relieved.

The pipe may then be rotated one-quarter turn, the couplings retightened, and service resumed. If performed on a regular basis, pipe rotation will evenly distribute wear over the entire inner surface of the pipe.

Curve Layout Drainage,

Buried Systems, etc.

The flexible design of the Gruvlok coupling makes it ideal for use in a wide variety of systems in which random changes of the pipe direction can be accommodated by the Gruvlok coupling's angular deflection capability rather than requiring the use of special fittings.



Pitched drainage systems, buried pipe systems where pipe laying conditions are subject to settlement, and exposed pipe systems laid on rough ground are but a few of the many types of pipe installations that present conditions where the functional capability of the Gruvlok coupling are useful.

Gruvlok Couplings — **Deflection From Centerline**

Fig. 7000, 7001, 7001-2 & 7003

Nominal Size	Deflection from ℄	
	Per Coupling	of Pipe
In./DN(mm)	Degrees(°)-Minutes(')	In./ft-mm/m
1 25	1° 22'	0.29 23.8
1½ 32	1° 5'	0.23 18.8
1½ 40	0° 57'	0.20 16.5
2 50	0° 45'	0.16 13.1
2½ 65	0° 37'	0.13 10.9
3 O.D. 76.1	0° 36'	0.13 10.4
3 80	0° 31'	0.11 8.9
3½ 90	0° 27'	0.09 7.8
4 100	1° 12'	0.25 20.8
4¼ O.D. 108.0	1° 16'	0.26 22.0
5 125	0° 58'	0.20 16.8
5¼ O.D. 133.0	1° 2'	0.21 17.9
5½ O.D. 139.7	0° 59'	0.20 17.0

Fig. 7000, 7001, 7001-2 & 7003

Nominal Size	Deflection from ℄	
	Per Coupling	of Pipe
In./DN(mm)	Degrees(°)-Minutes(')	In./ft-mm/m
6 150	0° 49'	0.17 14.1
6¼ O.D. 159.0	0° 51'	0.18 14.9
6½ O.D. 165.1	0° 50'	0.17 13.1
8 200	0° 37'	0.13 10.9
10 250	0° 30'	0.11 8.7
12 300	0° 25'	0.09 7.3
14 350	0° 23'	0.08 6.7
16 400	0° 20'	0.07 5.9
18 450	0° 18'	0.06 5.2
20 500	0° 16'	0.06 4.7
24 600	0° 13'	0.05 3.9
28" O.D. 733.4	0° 11'	0.04 3.2
30" O.D. 787.4	0° 10'	0.04 3.0

Gruvlok Couplings — **Deflection From Centerline** (Continued)

Fig. 7010

Nominal Size	Deflection from ℄	
	Per Coupling	of Pipe
In./DN(mm)	Degrees(°)-Minutes(')	In./ft-mm/m
2 x 1½ 50 x 40	0° 45'	0.16 13.1
2½ x 2 65 x 50	0° 37'	0.13 10.9
3 x 2 80 x 50	0° 31'	0.11 8.9
3 x 2½ 80 x 65	0° 31'	0.11 8.9
4 x 2 100 x 50	1° 12'	0.25 20.8
4 x 2½ 100 x 65	1° 12'	0.25 20.8
4 x 3 100 x 80	1° 12'	0.25 20.8
5 x 4 125 x 100	1° 58'	0.20 16.8
6 x 4 150 x 100	0° 49'	0.17 14.1
6 x 5 150 x 125	0° 49'	0.17 14.1
8 x 6 200 x 150	0° 37'	0.13 10.9

Fig. 7011

Nominal Size	Deflection from ℄	
	Per Coupling	of Pipe
In./DN(mm)	Degrees(°)-Minutes(')	In./ft-mm/m
30 O.D. 750	0° 16'	0.06 4.7

GRUVLOK
An ASC Engineered Solution

Gruvlok Couplings — **Range of Pipe End Separation**

Type of Coupling	Range of Pipe End Separation 0-1/32 (0-0.79) In./mm	Range of Pipe End Separation 0-3/32 (0-2.38) In./mm
Fig. 7000 LW Flexible Coupling	1, 1¼, 1½, 2, 2½, 3 O.D., 3, 3½ 25, 32, 40, 50, 65, 76.1, 80, 90	4, 4¼ O.D. 5, 5¼ O.D., 5½ O.D., 6, 6¼ O.D., 6½ O.D., 8 100, 108.0, 125, 133.0, 139.7, 150, 159.0, 165.1, 200
Fig. 7001 Standard Coupling	1, 1¼, 1½, 2, 2½, 3 O.D., 3, 3½ 25, 32, 40, 50, 65, 76.1, 80, 90	4, 5, 6, 6½ O.D., 8, 10, 12, 14, 16, 18, 20, 24, 28 O.D., 30 O.D. 100, 125, 150, 165.1, 200, 250, 300, 350, 400, 450, 500, 600, 733.4, 787.4
Fig. 7001-2 Standard Coupling	– –	14, 16, 18, 20, 24 350, 400, 450, 500, 600
Fig. 7003 Hingelok Coupling	1, 1¼, 1½, 2, 2½, 3 25, 32, 40, 50, 65, 80	4, 5, 6, 8 100, 125, 150, 200
Fig. 7010 Reducing Coupling	2 x 1½, 2½ x 2, 3 x 2, 3 x 2½ 50 x 40, 65 x 50, 80 x 50, 80 x 65	4 x 2, 4 x 2½, 4 x 3, 5 x 4, 6 x 4, 6 x 5, 8 x 6 100 x 50, 100 x 65, 100 x 80, 125 x 100, 150 x 100, 150 x 125, 200 x 150
Fig. 7011 Standard Coupling	The Range of Pipe End Separation for the 30" O.D. (750 mm) Coupling is 0-9/64 (0-3.57)	
Fig. 7400 Rigidlite Coupling	1, 1¼, 1½, 2, 2½, 3 O.D., 3 25, 32, 40, 50, 65, 76.1, 80	4, 5, 5½ O.D., 6, 6½ O.D., 8 100, 125, 139.7, 150, 165.1, 200
Fig. 7401 Rigidlok Coupling	1½, 2, 2½, 3 O.D., 3 40, 50, 65, 76.1, 80	4, 5, 5½ O.D., 6, 6½ O.D., 8,10, 12, 14, 16, 18, 20, 24 100, 125, 139.7, 150, 165.1, 200, 250, 300, 350, 400, 450, 500, 600
Fig. 7401-2 Rigidlok Coupling	– –	14, 16, 18, 20, 24 350, 400, 450, 500, 600

Nominal Coupling Sizes (In./DN(mm))

Gruvlok Couplings — **Range of Pipe End Separation** (Continued)

Fig. 7042 Outlet Coupling

Nominal Pipe Size				Nominal Pipe Size			
Run	Outlet		Range of Pipe End Separation	Run	Outlet		Range of Pipe End Separation
	FPT F	MPT/Grv. M/G			FPT F	MPT/Grv. M/G	
In./DN(mm)	In./mm	In./mm	In./mm	In./DN(mm)	In./mm	In./mm	In./mm
	½ 15	— —	¾ -1 1/16 19-27		¾ 20	— —	1 3/16 -1½ 30-38
1½ 40	¾ 20	— —	¾ -1 1/16 19-27	3 80	1 25	1 25	1 3/16 -1½ 30-38
	1 25	— —	¾ -1 1/16 19-27		— —	1½ 40	1 3/16 -1½ 30-38
	½ 15	— —	11/16 -1 17-25		¾ 20	— —	1 9/16 -1⅞ 40-48
2 50	¾ 20	— —	11/16 -1 17-25		1 25	— —	1 9/16 -1⅞ 40-48
	1 25	1 25	11/16 -1 17-25	4 100	— —	1½ 40	1 9/16 -1⅞ 40-48
	½ 15	— —	1 3/16 -1½ 30-38		— —	2 50	1 9/16 -1⅞ 40-48
	¾ 20	— —	1 3/16 -1½ 30-38		1 25	— —	1 5/8 -1 15/16 41-51
2½ 65	1 25	— —	1 3/16 -1½ 30-38	6 150	1½ 40	1½ 40	1 5/8 -1 15/16 41-51
	— —	1¼ 32	1 3/16 -1½ 30-38		— —	2 50	1 5/8 -1 15/16 41-51

Gruvlok Fittings Flow Data – Frictional Resistance

Flow Data – Frictional Resistance (Expressed as Equivalent Straight Pipe)

Nominal Size	O.D.	Pipe Wall Thickness	Elbow		Tee	
			90°	45°	Branch	Run
In./DN(mm)	In./mm	In./mm	Ft./m	Ft./m	Ft./m	Ft./m
1 25	1.315 33.4	0.133 3.4	1.7 0.5	0.9 0.3	4.4 1.3	1.7 0.5
1¼ 32	1.660 42.2	0.140 3.6	2.3 0.7	1.2 0.4	5.8 1.8	2.3 0.7
1½ 40	1.900 48.3	0.145 3.7	2.7 0.8	1.3 0.4	6.7 2.0	2.7 0.8
2 50	2.375 60.3	0.154 3.9	3.4 1.0	1.7 0.5	8.6 2.6	3.4 1.0
2½ 65	2.875 73.0	0.203 5.2	4.1 1.2	2.1 0.6	10.3 3.1	4.1 1.2
3 O.D. 76.1	2.996 76.1	0.197 5.0	4.3 1.3	2.2 0.7	10.8 3.3	4.3 1.3
3 80	3.500 88.9	0.216 5.5	5.1 1.6	2.6 0.8	12.8 3.9	5.1 1.6
4¼ O.D. 108.0	4.250 108.0	0.220 5.6	6.4 2.0	3.2 1.0	16.1 4.9	6.4 2.0
4 100	4.500 114.3	0.237 6.0	6.7 2.0	3.4 1.0	16.8 5.1	6.7 2.0
5¼ O.D. 133.0	5.236 133.0	0.248 6.3	8.0 2.4	4.0 1.2	20.1 6.1	8.0 2.4
5½ O.D. 139.7	5.500 139.7	0.248 6.3	8.3 2.5	4.2 1.3	20.9 6.4	8.3 2.5
5 125	5.563 141.3	0.258 6.6	8.4 2.6	4.2 1.3	21.0 6.4	8.4 2.6
6¼ O.D. 159.0	6.259 159.0	0.280 7.1	9.7 3.0	4.9 1.5	24.3 7.4	9.7 3.0
6½ O.D. 165.1	6.500 165.1	0.280 7.1	10.0 3.0	5.0 1.5	24.9 7.6	10.0 3.0
6 150	6.625 168.3	0.280 7.1	10.1 3.1	5.1 1.6	25.3 7.7	10.1 3.1

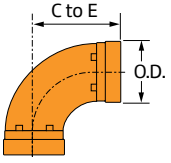
Gruvlok Fittings Flow Data – Frictional Resistance (Continued)

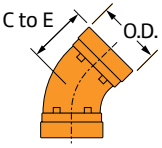
Flow Data – Frictional Resistance (Expressed as Equivalent Straight Pipe) (Continued)

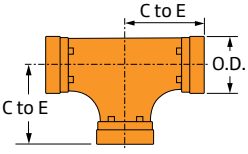
Nominal Size	O.D.	Pipe Wall Thickness	Elbow		Tee	
			90°	45°	Branch	Run
In./DN(mm)	In./mm	In./mm	Ft./m	Ft./m	Ft./m	Ft./m
8 200	8.625 219.1	0.322 8.2	13.3 4.1	6.7 2.0	33.3 10.1	13.3 4.1
10 250	10.750 273.1	0.365 9.3	16.7 5.1	8.4 2.6	41.8 12.7	16.7 5.1
12 300	12.750 323.9	0.375 9.5	20.0 6.1	10.0 3.0	50.0 15.2	20.0 6.1
14 350	14.000 355.6	0.375 9.5	22.2 6.8	17.7 5.4	64.2 19.6	22.9 7.0
16 400	16.000 406.4	0.375 9.5	25.5 7.8	20.4 6.2	73.9 22.5	26.4 8.0
18 450	18.000 457.2	0.375 9.5	28.9 8.8	23.1 7.0	87.2 26.6	31.1 9.5
20 500	20.000 508.0	0.375 9.5	32.2 9.8	25.7 7.8	97.3 29.7	34.8 10.6
24 600	24.000 609.6	0.375 9.5	38.9 11.9	31.1 9.5	113.0 34.4	40.4 12.3

For the reducing tee and branches, use the value that is corresponding to the branch size.
For example: for 6" x 6" x 3" tee, the branch value of 3" is 12.8 ft (3.9).

Gruvlok Fittings for Grooved End Pipe



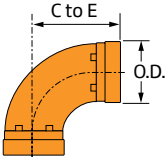


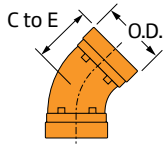


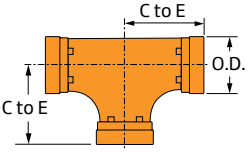
Gruvlok Fittings

Nominal Size	O.D.	Center to End Dimensions		
		Fig. 7050 90° Elbow	Fig. 7051 45° Elbow	Fig. 7060 Tee
In./DN(mm)	In./mm	In./mm	In./mm	In./mm
1 25	1.315 33.4	2¼ C 57	1¾ C 44	2¼ C 57
1¼ 32	1.660 42.2	2¾ C 70	1¾ C 44	2¾ C 70
1½ 40	1.900 48.3	2¾ C 70	1¾ C 44	2¾ C 70
2 50	2.375 60.3	3¼ C 83	2 C 51	3¼ C 83
2½ 65	2.875 73.0	3¾ C 95	2¼ C 57	3¾ C 95
3 O.D. 76.1	2.996 76.1	4 C 102	2½ C 64	4 C 101
3 80	3.500 88.9	4¼ C 108	2½ C 64	4¼ C 108
3½ 90	4.000 101.6	4½ C 114	2¾ C 70	4½ C 114
4¼ O.D. 108.0	4.250 108.0	4¾ C 121	2⅞ C 83	4¾ C 121
4 100	4.500 114.3	5 C 127	3 C 76	5 C 127
5¼ O.D. 133.0	5.236 133.0	5¼ C 133	3¼ C 83	5¼ C 133
5½ O.D. 139.7	5.500 139.7	5¼ C 133	3¼ C 83	5½ C 140
5 125	5.563 141.3	5½ C 140	3¼ C 83	5½ C 140

Gruvlok Fittings for Grooved-End Pipe (Continued)







Gruvlok Fittings (Continued)

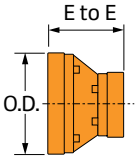
Nominal Size	O.D.	Center to End Dimensions		
		Fig.7050 90° Elbow	Fig.7051 45° Elbow	Fig.7060 Tee
In./DN(mm)	In./mm	In./mm	In./mm	In./mm
6¼ O.D.	6.259	6 C	3½ C	6 C
159.0	159.0	152	89	152
6½ O.D.	6.500	6½ C	3½C	6½C
165.1	165.1	165	89	165
6	6.625	6½ C	3½ C	6½ C
150	168.3	165	89	165
8	8.625	7¾ C	4¼ C	7¾ C
200	219.1	197	108	197
10	10.750	9 C	4¾C	9 C
250	273.1	229	121	229
12	12.750	10 C	5¼ C	10 C
300	323.9	254	133	254

C - Cast malleable or ductile iron, all others are fabricated steel.

Center to end dimensions may differ from those shown in chart, contact an ASC Rep. for more information.

GRUVLOK
An ASC Engineered Solution

Gruvlok Fittings for Grooved-End Pipe (Continued)



Gruvlok Fittings

Fig. 7072 Concentric Reducer

Nominal Size	End to End
In./DN(mm)	In./mm
1¼ x 1 32 x 25	2½ 64
1½ x 1, 1¼ 40 x 25, 32	2½ 64
2 x 1, 1¼*, 1½ 50 x 25, 32, 40	2½ 64
2½ x 1, 1¼, 1½ , 2* 65 x 25, 32, 40, 50	2½ 64
3 x 1, 1¼, 1½ , 2*, 2½ * 80 x 25, 32, 40, 50, 65	2½ 64
3½ x 3 90 x 80	3 76

Fig. 7072 Concentric Reducer

Nominal Size	End to End
In./DN(mm)	In./mm
4 x 1, 1¼, 1½ , 2*, 2½ *, 3*, 3½ 100 x 25, 32, 40, 50, 65, 80, 90	3 76
5 x 2, 2½ , 3, 4* 125 x 50, 65, 80, 100	3½ 89
6 x 1, 1½, 2*, 2½, 3*, 4*, 5* 150 x 25, 40, 50, 65, 80, 100, 125	4 102
8 x 3, 4*, 5, 6* 200 x 80, 100, 125, 150	5 127
10 x 4, 5, 6*, 8 250 x 100, 125, 150, 200	6 152
12 x 4, 6, 8, 10 300 x 100, 150, 200, 250	7 178

*- Cast malleable or ductile iron, all others are fabricated steel.

Standard Weight Pipe Data & Barlow's Formula

Standard Weight Pipe Data

Nominal Pipe Diameter (Inches)	Actual Inside Diameter (Inches)	Actual Outside Diameter (Inches)	Weight per Foot (Pounds)	Length in Feet containing One Cubic Foot (Feet)	Gallons in One Linear Foot (Gallons)
⅛	0.269	0.405	0.245	2,526.000	0.0030
¼	0.364	0.540	0.425	1,383.800	0.0054
⅜	0.493	0.675	0.568	754.360	0.0099
½	0.622	0.840	0.851	473.910	0.0158
¾	0.824	1.050	1.131	270.030	0.0277
1	1.049	1.315	1.679	166.620	0.0449
1¼	1.380	1.660	2.273	96.275	0.0777
1½	1.610	1.900	2.718	70.733	0.1058
2	2.067	2.375	3.653	49.913	0.1743
2½	2.469	2.875	5.793	30.077	0.2487
3	3.068	3.500	7.580	19.479	0.3840
3½	3.548	4.000	9.110	14.565	0.5136
4	4.026	4.500	10.790	11.312	0.6613
5	5.047	5.563	14.620	7.198	1.0393
6	6.065	6.625	18.970	4.984	1.5008
8	7.981	8.625	28.550	2.878	2.5988
10	10.020	10.750	40.480	1.826	4.0963

Barlow's Formula

Barlow's Formula is a safe, easy method for finding the relationship between internal fluid pressure and stress in the pipe wall. The formula predicts bursting pressures that have been found to be safely within the actual test bursting pressures.

It is interesting to note that the formula uses the "outside diameter" of pipe and is sometimes referred to as the "outside diameter formula."

$$P = (2 \cdot t \cdot S) / D$$

Where:

P = internal units pressure, in psi
S = unit stress, in psi
D = outside diameter of pipe, in inches
t = wall thickness, in inches

Commercial Pipe Sizes and Wall Thicknesses

This table lists standard pipe sizes and wall thicknesses, or specifically:

1. Traditional standard weight, extra strong & durable extra strong pipe.
2. Pipe wall thickness in ASME B36.10 for carbon steel.
3. Pipe wall thickness in ASTM Specification A409 & ASME B36.19 & applicable only to corrosion resistant materials.

Commercial Pipe Sizes and Wall Thicknesses

Nom. Pipe Size	Outside Dia. (IN)	Nominal Wall Thickness For							
		Sch 5S	Sch 10	Sch 10S	Sch 20	Sch 30	Sch Std.	Sch 40	Sch 40S
⅛	0.405	-	0.049	0.049	-	-	0.068	0.068	0.068
¼	0.540	-	0.065	0.065	-	-	0.088	0.088	0.088
⅜	0.675	-	0.065	0.065	-	-	0.091	0.091	0.091
½	0.840	0.065	0.083	0.083	-	-	0.109	0.109	0.109
¾	1.050	0.065	0.083	0.083	-	-	0.113	0.113	0.113
1	1.315	0.065	0.109	0.109	-	-	0.133	0.133	0.133
1¼	1.660	0.065	0.109	0.109	-	-	0.140	0.140	0.140
1½	1.900	0.065	0.109	0.109	-	-	0.145	0.145	0.145
2	2.375	0.065	0.109	0.109	-	-	0.154	0.154	0.154
2½	2.875	0.083	0.120	0.120	-	-	0.203	0.203	0.203
3	3.500	0.083	0.120	0.120	-	-	0.216	0.216	0.216
3½	4.000	0.083	0.120	0.120	-	-	0.226	0.226	0.226
4	4.500	0.083	0.120	0.120	-	-	0.237	0.237	0.237
5	5.563	0.109	0.134	0.134	-	-	0.258	0.258	0.258
6	6.625	0.109	0.134	0.134	-	-	0.280	0.280	0.280
8	8.625	0.109	0.148	0.148	0.250	0.277	0.322	0.322	0.322
10	10.750	0.134	0.165	0.165	0.250	0.307	0.365	0.365	0.365
12	12.750	0.156	0.180	0.180	0.250	0.330	0.375	0.406	0.375
14	14.000	0.156	0.250	0.188	0.312	0.375	0.375	0.438	-
16	16.000	0.165	0.250	0.188	0.312	0.375	0.375	0.500	-
18	18.000	0.165	0.250	0.188	0.312	0.438	0.375	0.562	-
20	20.000	0.188	0.250	0.218	0.375	0.500	0.375	0.594	-
22	22.000	0.188	0.250	0.218	0.375	0.500	0.375	-	-
24	24.000	0.218	0.250	-	0.375	0.562	0.375	0.688	-

All dimensions in inches & thicknesses are nominal or average wall thickness.
Actual thickness may be as much as 12.5% under nominal due to mill tolerance.

Commercial Pipe Sizes and Wall Thicknesses (Continued)

Commercial Pipe Sizes and Wall Thicknesses (Continued)

Nom. Pipe Size	Outside Dia. (IN)	Nominal Wall Thickness For								
		Sch 60	Sch 80	Sch 80S	Sch 100	Sch 120	Sch. 140	Sch. 160	X Strong	XX Strong
⅛	0.405	-	0.095	0.095	-	-	-	-	0.095	-
¼	0.540	-	0.119	0.119	-	-	-	-	0.119	-
⅜	0.675	-	0.126	0.126	-	-	-	-	0.126	-
½	0.840	-	0.147	0.147	-	-	-	0.187	0.147	0.294
¾	1.050	-	0.154	0.154	-	-	-	0.219	0.154	0.308
1	1.315	-	0.179	0.179	-	-	-	0.250	0.179	0.358
1¼	1.660	-	0.191	0.191	-	-	-	0.250	0.191	0.382
1½	1.900	-	0.200	0.200	-	-	-	0.281	0.200	0.400
2	2.375	-	0.218	0.218	-	-	-	0.344	0.218	0.436
2½	2.875	-	0.276	0.276	-	-	-	0.375	0.276	0.552
3	3.500	-	0.300	0.300	-	-	-	0.437	0.300	0.600
3½	4.000	-	0.318	0.318	-	-	-	-	0.318	0.636
4	4.500	-	0.337	0.337	-	0.438	-	0.531	0.337	0.674
5	5.563	-	0.375	0.375	-	0.500	-	0.625	0.375	0.750
6	6.625	-	0.432	0.432	-	0.562	-	0.719	0.432	0.864
8	8.625	0.406	0.500	0.500	0.594	0.719	0.812	0.906	0.500	0.875
10	10.750	0.500	0.594	0.500	0.719	0.844	1.000	1.125	0.500	1.000
12	12.750	0.562	0.688	0.500	0.844	1.000				
14	14.000	0.594	0.750	-	0.938	1.094	1.250	1.406	0.500	-
16	16.000	0.656	0.844	-	1.031	1.219	1.438	1.594	0.500	-
18	18.000	0.750	0.938	-	1.156	1.375	1.562	1.781	0.500	-
20	20.000	0.812	1.031	-	1.281	1.500	1.750	1.969	0.500	-
22	22.000	0.875	1.125	-	1.375	1.625	1.875	2.125	0.500	-
24	24.000	0.969	1.219	-	1.531	1.812	2.062	2.344	0.500	-

Commercial Pipe Sizes and Wall Thicknesses (Continued)

Commercial Pipe Sizes and Wall Thicknesses (Continued)

Nom. Pipe Size	Outside Dia. (IN)	Nominal Wall Thickness For							
		Sch 5S	Sch 10	Sch 10S	Sch 20	Sch 30	Sch Std.	Sch 40	Sch 40S
26	26.000	-	0.312	-	0.500	-	0.375	-	-
28	28.000	-	0.312	0.312	0.500	0.625	0.375	-	-
30	30.000	0.250	0.312	-	0.500	0.625	0.375	-	-
32	32.000	-	0.312	-	0.500	0.625	0.375	0.688	-
34	34.000	-	0.312	-	0.500	0.625	0.375	0.688	-
36	36.000	-	0.312	-	0.500	0.625	0.375	0.750	-
42	42.000	-	-	-	0.500	0.625	0.375	0.750	-

Steel Pipe Data – Schedule No. 40 & 80

Schedule No. 40 & 80					
Pipe Size	O.D.	Schedule No.	Wall Thickness	Weight per Foot	Weight of Water per Foot
In.	In.	-	In.	Lbs.	Lbs.
⅜	0.675	40	0.091	0.567	0.083
		80	0.126	0.738	0.061
½	0.840	40	0.109	0.850	0.132
		80	0.147	1.087	0.101
¾	1.050	40	0.113	1.130	0.230
		80	0.154	1.473	0.186
1	1.315	40	0.133	1.678	0.374
		80	0.179	2.171	0.311
1¼	1.660	40	0.140	2.272	0.647
		80	0.191	2.996	0.555
1½	1.900	40	0.145	2.717	0.882
		80	0.200	3.631	0.765
2	2.375	40	0.154	3.652	1.452
		80	0.218	5.022	1.279
2½	2.875	40	0.203	5.790	2.072
		80	0.276	7.660	1.834
3	3.500	40	0.216	7.570	3.200
		80	0.300	10.250	2.860
3½	4.000	40	0.226	9.110	4.280
		80	0.318	12.510	3.850
4	4.500	40	0.237	10.790	5.510
		80	0.337	14.980	4.980

Steel Pipe Data – Schedule No. 40 & 80 (Continued)

Schedule No. 40 & 80 (Continued)

Pipe Size	O.D.	Schedule No.	Wall Thickness	Weight per Foot	Weight of Water per Foot
In.	In.	-	In.	Lbs.	Lbs.
5	5.563	40	0.258	14.620	8.660
		80	0.375	20.780	7.870
6	6.625	40	0.280	18.970	12.510
		80	0.432	28.570	11.290
8	8.625	40	0.322	28.550	21.600
		80	0.500	43.390	19.800
10	10.750	40	0.365	40.480	34.100
		80	0.593	64.400	31.100
12	12.75	40	0.406	53.600	48.500
		80	0.687	88.600	44.000
14	14.000	40	0.437	63.000	58.500
		80	0.750	107.000	51.200
16	16.000	40	0.500	83.000	76.500
		80	0.843	137.000	69.700
18	18.000	40	0.563	105.000	97.200
		80	0.937	171.000	88.500
20	20.000	40	0.593	123.000	120.400
		80	1.031	209.000	109.400
24	24.000	40	0.687	171.000	174.200
		80	1.218	297.000	158.200
30	30.000	20	0.500	158.000	286.000
36	36.000	API	0.500	190.000	417.000

Copper Tube Data – Type L

Type L					
Tube Size	O.D. Tubing	O.D.	Wall Thickness	Weight per Foot	Weight of Water per Foot
In.	In.	In.	In.	Lbs.	Lbs.
¼	⅜	0.375	0.030	0.126	0.034
⅜	½	0.500	0.035	0.198	0.062
½	⅝	0.625	0.040	0.285	0.100
⅝	¾	0.750	0.042	0.362	0.151
¾	⅞	0.875	0.045	0.455	0.209
1	1⅛	1.125	0.050	0.655	0.357
1¼	1⅜	1.375	0.055	0.884	0.546
1½	1⅝	1.625	0.060	1.140	0.767
2	2⅛	2.125	0.070	1.750	1.341
2½	2⅝	2.625	0.080	2.480	2.064
3	3⅛	3.125	0.090	3.330	2.949
3½	3⅝	3.625	0.100	4.290	3.989
4	4⅛	4.125	0.110	5.380	5.188
5	5⅛	5.125	0.125	7.610	8.081
6	6⅛	6.125	0.140	10.200	11.616
8	8⅛	8.125	0.200	19.290	20.289
10	10⅛	10.125	0.250	30.100	31.590
12	12⅛	12.125	0.280	40.400	45.426

Copper Tube Data – Type K

Type K					
Tube Size	O.D. Tubing	O.D.	Wall Thickness	Weight per Foot	Weight of Water per Foot
In.	In.	In.	In.	Lbs.	Lbs.
¼	⅜	0.375	0.035	0.145	0.032
⅜	½	0.500	0.049	0.269	0.055
½	⅝	0.625	0.049	0.344	0.094
⅝	¾	0.750	0.049	0.418	0.144
¾	⅞	0.875	0.065	0.641	0.188
1	1⅛	1.125	0.065	0.839	0.337
1¼	1⅜	1.375	0.065	1.040	0.527
1½	1⅝	1.625	0.072	1.360	0.743
2	2⅛	2.125	0.083	2.060	1.310
2½	2⅝	2.625	0.095	2.920	2.000
3	3⅛	3.125	0.109	4.000	2.960
3½	3⅝	3.625	0.120	5.120	3.900
4	4⅛	4.125	0.134	6.510	5.060
5	5⅛	5.125	0.160	9.670	8.000
6	6⅛	6.125	0.192	13.870	11.200
8	8⅛	8.125	0.271	25.900	19.500
10	10⅛	10.125	0.338	40.300	30.423
12	12⅛	12.125	0.405	57.800	43.675

ASTM Carbon Steel Pipe and Flange Specifications

Description and Applications	Spec No.	ASTM or Type	Grade Strength PSI	Yield Point or Strength PSI	Elongation (% in 2")				Chemical Composition, %			
					STD Round	Rectangular t	Rectangular 5/16"	Rectangular 5/16"	C	MN	P	S
Pipe and Tubing												
Seamless milled steel pipe for high-temperature service, suitable for bending, flanging & similar forming operations.	(1) A106	A	48,000	30,000	28 long. OR (4) 20 trans.	17.5+ or 12.5+	56t 40t	35 25	.25 max	.27 to.93	.048 max	.058 max
As above, except use Grade A for close coiling, cold bending or forge welding.	(1) A106	B	60,000	35,000	28 long. OR (4) 12 trans.	17.5+ or 6.5+	56t 32t	35 16.5	.30 max	.27 to 1.06	.048 max	.058 max
Black or hot-dip galvanize seamless or res-welded steel pipe suitable for coiling, bending, flanging, & other special purposes, suitable for welding.	A 53	A	48,000	30,000	28	17.5+	56t	35	(2)	–	(3)	–
As above, except use Grade A for close coiling, cold bending or forge welding.	A 53	B	60,000	35,000	22	15+	48t	30	(2)	–	(3)	–
Black or hot-dip galvanize seamless or res. welded steel pipe suitable for ordinary uses. (When tension, flattening or bend test required, order to A-53).	A 120 (obsolete)	–	–	–	–	–	–	–	–	–	–	–
Resistance welded steel pipe for liquid, gas or vapor.	A 135	A	48,000	30,000	–	17.5+	56t	35	–	–	.050 max	.060 max

ASTM Carbon Steel Pipe and Flange Specifications (Continued)

Description and Applications	Spec No.	ASTM or Type	Grade Strength PSI	Yield Point or Strength PSI	Elongation (% in 2")				Chemical Composition, %			
					STD Round	Rectangular						
						t	5/16"	5/16"	C	MN	P	S
As above, except use Grade A for flanging & bending.	A 135	B	60,000	35,000	–	15+	48t	30	–	–	.050 max	.060 max
Forged Pipe, Flanges												
Forged or rolled steel pipe flanges, fittings (6) values and parts for high temperature service. Heat treatment required; may be annealed or normalized.	A105	I	60,000	30,000	25		–	–	.35 (5) max	.90 max	.05 max	.05 max
As above	A 105	II	70,000	36,000	22		–	–	.35 (5) max	.90 max	.05 max	.05 max
As above except for general service. Heat treatment is not required.	A 181	I	60,000	30,000	22		–	–	.35 (5) max	.90 max	.05 max	.05 max
As above	A 181	II	70,000	36,000	18		–	–	.35 (5) max	.90 max	.05 max	.05 max

(1) 0.10% silicon minimum.

(2) Open hearth, 0.13 max for 1/8" and 1/4" size resistance welded pipe only

(3) Seamless: open hearth 0.048 max, acid bessemar 0.11 max; Res. welded: open hearth 0.050 max.

(4) Longitudinal or transverse direction of test specimen with respect to pipe axis

(5) When flanges will be subject to fusion welding, carbon content shall be ≤0.35%. If carbon is ≤0.35%, it may be necessary to add silicon to meet required tensile properties. The silicon content shall be ≤0.35%.

(6) Factor-made Wrought Carbon Steel and Ferritic Alloy Steel Welding Fitting Specifications are covered under ASTM A234.

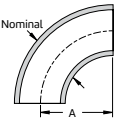
Pipe and Water Weight Per Line Foot

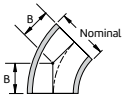
Nominal Pipe Size	Weight of:		Weight of:	
	Std. Pipe	Water	XS Pipe	Water
In.	Lbs.		Lbs.	
½	0.851	0.132	1.088	0.101
¾	1.131	0.230	1.474	0.188
1	1.679	0.374	2.172	0.311
1¼	2.273	0.648	2.997	0.555
1½	2.718	0.882	3.631	0.765
2	3.653	1.455	5.022	1.280
2½	5.793	2.076	7.661	1.837
3	7.580	3.200	10.250	2.864
3½	9.110	4.280	12.510	3.850
4	10.790	5.510	14.980	4.980
5	14.620	8.660	20.780	7.890
6	18.970	12.510	28.570	11.290
8	28.550	21.690	43.390	19.800
10	40.480	34.100	54.740	32.300
12	49.580	49.000	65.420	47.000
14	54.570	59.700	72.090	57.500
16	62.580	79.100	82.770	76.500
18	70.590	101.200	93.450	98.400
20	78.600	126.000	104.130	122.800
24	94.620	183.800	125.490	180.100
30	119.000	291.200	158.000	286.200

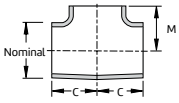
Weight Per Foot of Seamless Brass and Copper Pipe

Nominal Pipe Size	Regular			Extra Strong		
	Yellow Brass	Red Brass	Copper	Yellow Brass	Red Brass	Copper
In.	Lbs.			Lbs.		
½	0.91	0.93	0.96	1.19	1.23	1.25
¾	1.23	1.27	1.30	1.62	1.67	1.71
1	1.73	1.78	1.82	2.39	2.49	2.51
1¼	2.56	2.63	2.69	3.29	3.39	3.46
1½	3.04	3.13	3.20	3.99	4.10	4.19
2	4.01	4.12	4.22	5.51	5.67	5.80

Weld Fittings – 90˚ Elbow, 45˚ Elbow, Tee & Conc. Reducer



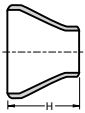




Weld Fittings

Nom. Pipe Size	90˚ Elbows		45˚ Elbows	Straight Tees
	Long R A	Short R A	B	C & M
½	1½	--	5/8	1
¾	1⅛	--	7/16	1⅛
1	1½	1	⅞	1½
1¼	1⅞	1¼	1	1⅞
1½	2¼	1½	1⅛	2¼
2	3	2	1⅜	2½
2½	3¾	2½	1¾	3
3	4½	3	2	3⅜
3½	5¼	3½	2¼	3¾
4	6	4	2½	4⅛
5	7½	5	3⅛	4⅞
6	9	6	3¾	5⅝
8	12	8	5	7
10	15	10	6¼	8½
12	18	12	7½	10

All dimensions shown are in inches.

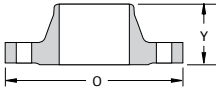


Weld Fittings

Concentric Reducers		Concentric Reducers	
Nom. Pipe Size	H	Nom. Pipe Size	H
¾ x ⅜ , ½	1½	3½ x 1¼, 1½, 2, 2½, 3	4
1 x ⅜ , ½ , ¾	2	4 x 1½, 2, 2½, 3, 3½	4
1¼ x ½, ¾, 1	2	5 x 2, 2½, 3, 3½, 4	5
1½ x ½, ¾, 1,1¼	2½	6 x 2½, 3, 3½, 4, 5	5½
2 x ¾, 1, 1¼, 1½	3	8 x 3½, 4, 5, 6	6
2½ x 1, 1¼, 1½, 2	3½	10 x 4, 5, 6, 8	7
3 x 1¼, 1½, 2, 2½	3½	12 x 5, 6, 8, 10	8

All dimensions shown are in inches.

Weld Fittings – Welding Neck Flanges

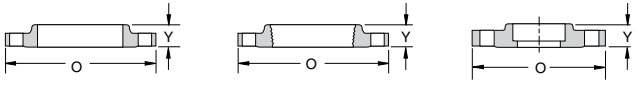


Welding Neck Flanges

Nom. Pipe Size	150 LB.		300 LB.		400 LB.		600 LB.	
	O	Y(1)	O	Y(1)	O	Y(2)	O	Y(2)
½	3½	1⅞	3¾	2 1/16	3¾	2 1/16	3¾	2 1/16
¾	3⅞	2 1/16	4⅝	2¼	4⅝	2¼	4⅝	2¼
1	4¼	2 3/16	4⅞	2 7/16	4⅞	2 7/16	4⅞	2 7/16
1¼	4⅝	2¼	5¼	2 9/16	5¼	2⅝	5¼	2⅝
1½	5	2 7/16	6⅛	2 11/16	6⅛	2¾	6⅛	2¾
2	6	2½	6½	2¾	6½	2⅞	6½	2⅞
2½	7	2¾	7½	3	7½	3⅛	7½	3⅛
3	7½	2¾	8¼	3⅛	8¼	3¼	8¼	3¼
3½	8½	2 13/16	9	3 3/16	9	3¾	9	3⅜
4	9	3	10	3⅜	10	3½	10¾	4
5	10	3½	11	3⅞	11	4	13	4½
6	11	3½	12½	3⅞	12½	4 1/16	14	4⅝
8	13½	4	15	4⅜	15	4⅝	16½	5¼
10	16	4	17½	4⅝	17½	4⅞	20	6
12	19	4½	20½	5⅛	20½	5⅜	22	6⅛

(1) The 1/16" raised face is included in length thru Hub, "Y".
(2) The ¼" raised face is not included in length thru Hub, "Y".
All dimensions shown are in inches.

Weld Fittings – Slip-On, Threaded & Socket Flanges

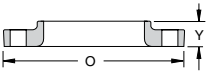


Slip-On, Threaded and Socket Flanges

Nom. Pipe Size	150 LB.		300 LB.		400 LB.†		600 LB.	
	O	Y(1)	O	Y(1)	O	Y(2)	O	Y(2)
½	3½	5/8	3¾	7/8	3¾	7/8	3¾	7/8
¾	3⅞	5/8	4⅝	1	4⅝	1	4⅝	1
1	4¼	11/16	4⅞	1 1/16	4⅞	1 1/16	4⅞	1 1/16
1¼	4⅝	13/16	5¼	1 1/16	5¼	1⅛	5¼	1⅛
1½	5	7/8	6⅛	1 3/16	6⅛	1¼	6⅛	1¼
2	6	1	6½	1 5/16	6½	1 7/16	6½	1 7/16
2½	7	1⅛	7½	1½	7½	1⅝	7½	1⅝
3	7½	1 3/16	8¼	1 11/16	8¼	1 13/16	8¼	1 13/16
3½	8½	1¼†	9	1¾†	9	1 15/16	9	1 15/16†
4	9	1 5/16†	10	1⅞†	10	2	10¾	2⅛†
5	10	1 7/16†	11	2†	11	2⅛	13	2⅜*†
6	11	1 9/16†	12½	2 1/16†	12½	2¼	14	2⅝†
8	13½	1¾†	15	2 7/16†	15	2 11/16	16½	3†
10	16	1 15/16†	17½	2⅝†	17½	2⅞	20	3⅜†
12	19	2 3/16†	20½	2⅞†	20½	3⅛	22	3⅝†

*Not available in Threaded type.
† Not available in Socket type.
(1) The 1/16" raised face is included in length thru Hub, "Y".
(2) The 1/4" raised face is not included in length thru Hub, "Y".
All dimensions shown are in inches.

Weld Fittings — Lap Joint Flanges

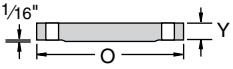


Lap Joint Flanges

Nom. Pipe Size	150 LB.		300 LB.		400 LB.		600 LB.	
	O	Y	O	Y	O	Y	O	Y
½	3½	5/8	3¾	7/8	3¾	7/8	3¾	7/8
¾	3⅞	5/8	4⅝	1	4⅝	1	4⅝	1
1	4¼	11/16	4⅞	1 1/16	4⅞	1 1/16	4⅞	1 1/16
1¼	4⅝	13/16	5¼	1 1/16	5¼	1⅛	5¼	1⅛
1½	5	7/8	6⅛	1 3/16	6⅛	1¼	6⅛	1¼
2	6	1	6½	1 5/16	6½	1 7/16	6½	1 7/16
2½	7	1⅛	7½	1½	7½	1⅝	7½	1⅝
3	7½	1 3/16	8¼	1 11/16	8¼	1 13/16	8¼	1 13/16
3½	8½	1¼	9	1¾	9	1 15/16	9	1 15/16
4	9	1 5/16	10	1⅞	10	2	10¾	2⅛
5	10	1 7/16	11	2	11	2⅛	13	2⅜
6	11	1 9/16	12½	2 1/16	12½	2¼	14	2⅝
8	13½	1¾	15	2 7/16	15	2 11/16	16½	3
10	16	1 15/16	17½	3¾	17½	4	20	4⅜
12	19	2 3/16	20½	4	20½	4¼	22	4⅝

All dimensions shown are in inches.

Weld Fittings – Blind Flanges



Blind Flanges

Nom. Pipe Size	150 LB.		300 LB.		400 LB.		600 LB.	
	O	Y(1)	O	Y(1)	O	Y(2)	O	Y(2)
½	3½	7/16	3¾	9/16			3¾	9/16
¾	3⅞	½	4⅝	⅝			4⅝	⅝
1	4¼	9/16	4⅞	1 1/16			4⅞	1 1/16
1¼	4⅝	⅝	5¼	¾	For Sizes 3½ and Smaller use 600 LB. Standard		5¼	1 3/16
1½	5	1 1/16	6⅛	1 1/16			6⅛	⅞
2	6	¾	6½	⅞			6½	1
2½	7	⅞	7½	1			7½	1⅛
3	7½	1 5/16	8¼	1⅛			8¼	1¼
3½	8½	1 5/16	9	1 3/16			9	1⅜
4	9	1 5/16	10	1¼	10	1⅜	10¾	1½
5	10	1 5/16	11	1⅜	11	1½	13	1¾
6	11	1	12½	1 7/16	12½	1⅝	14	1⅞
8	13½	1⅛	15	1⅝	15	1⅞	16½	2 3/16
10	16	1 3/16	17½	1⅞	17½	2⅛	20	2½
12	19	1¼	20½	2	20½	2¼	22	2⅝

(1) The 1/16" raised face is included in Thickness, "Y".
(2) The ¼" raised face is not included in Thickness, "Y".
All dimensions shown are in inches.

Standard Cast Iron Companion Flanges and Bolts
(for working pressures up to 125 psi steam, 175 psi WOG)

Size	Flange Dia.	Bolt Circle	No. of Bolts	Bolt Size	Bolt Length
¾	3½	2½	4	⅜	2
1	4¼	3⅛	4	½	2¼
1¼	4⅝	3½	4	½	2¼
1½	5	3⅞	4	½	2½
2	6	4¾	4	⅝	2¾
2½	7	5½	4	⅝	3
3	7½	6	4	⅝	3
3½	8½	7	8	⅝	3
4	9	7½	8	⅝	3
5	10	8½	8	¾	3¼
6	11	9½	8	¾	3¼
8	13½	11¾	8	¾	3½
10	16	14¼	12	⅞	4
12	19	17	12	⅞	4
14	21	18¾	12	1	4½
16	23½	21¼	16	1	4½

All dimensions shown are in inches.

ASC Engineered Solutions

Extra Heavy Cast Iron Companion Flanges and Bolts
(for working pressures up to 250 psi steam, 400 psi WOG)

Size	Flange Dia.	Bolt Circle	No. of Bolts	Bolt Size	Bolt Length
1	4⅞	3½	4	⅝	2½
1¼	5¼	3⅞	4	⅝	2¾
1½	6⅛	4½	4	¾	3
2	6½	5	8	⅝	3
2½	7½	5⅞	8	¾	3¼
3	8¼	6⅝	8	¾	3½
3½	9	7¼	8	¾	3¾
4	10	7⅞	8	¾	3¾
5	11	9¼	8	¾	4¼
6	12½	10⅝	12	¾	4¼
8	15	13	12	⅞	4¾
10	17½	15¼	16	1	5½
12	20½	17¾	16	1⅛	5¾
14 O.D.	23	20¼	20	1⅛	6½
16 O.D.	25½	22½	20	1¼	6½
18 O.D.	28	24¾	24	1¼	6¾
20 O.D.	30½	27	24	1¼	7⅛
24 O.D.	36	32	24	1½	8

All dimensions shown are in inches.

GRUVLOK
An ASC Engineered Solution

Bolt Dimensions for 150 to 300 LB. Steel Flange

Nom. Pipe Size	125/150 LB. Flange					250/300 LB. Flange				
	Bolt Circle Diameter	Bolt Diameter	No. of Bolts	*Stud Length	Bolt Length	Bolt Circle Diameter	Bolt Diameter	No.of Bolts	*Stud Length	Bolt Length
½	2⅜	½	4	2¼	2	2⅝	½	4	2½	2¼
¾	2¾	½	4	2½	2	3¼	⅝	4	3	2½
1	3⅛	½	4	2½	2¼	3½	⅝	4	3	2½
1¼	3½	½	4	2¾	2¼	3⅞	⅝	4	3¼	2¾
1½	3⅞	½	4	2¾	2½	4½	¾	4	3½	3
2	4¾	⅝	4	3¼	2¾	5	⅝	8	3¼	3
2½	5½	⅝	4	3½	3	5⅞	¾	8	4	3¼
3	6	⅝	4	3½	3	6⅝	¾	8	4¼	3½
3½	7	⅝	8	3½	3	7¼	¾	8	4¼	3¾
4	7½	⅝	8	3½	3	7⅞	¾	8	4½	3¾
5	8½	¾	8	3¾	3¼	9¼	¾	8	4¾	4¼
6	9½	¾	8	4	3¼	10⅝	¾	12	4¾	4¼
8	11¾	¾	8	4¾	3½	13	⅞	12	5½	4¾
10	14¼	⅞	12	4½	4	15¼	1	16	6¼	5½
12	17	⅞	12	4¾	4	17¾	1⅛	16	6¾	5¾
14	18¾	1	12	5¼	4½	20¼	1⅛	20	7	6¼
16	21¼	1	16	5¼	4½	22½	1¼	20	7½	6½
18	22¾	1⅛	16	5¾	5	24¾	1¼	24	7¾	6¾
20	25	1⅛	20	6¼	5½	27	1¼	24	8	7¼
22	27¼	1¼	20	7	5½	29¼	1½	24	9¼	7½
24	29½	1¼	20	6¾	6	32	1½	24	9	8
26	31¾	1¼	24	8¾	6	34½	1⅝	28	10½	8¾
30	36	1¼	28	9¼	6¼	39¼	1¾	28	11⅞	10
34	40½	1½	32	10½	7	43½	1⅞	28	13	10¾
36	42¾	1½	32	11	7	46	2	32	13½	11¼
42	49½	1½	36	11½	7¼	47½	1⅝	36	13½	13½

*1/16" Raised Face.
Stud lengths for lap joint flanges are equal to lengths shown plus the thickness of two laps of the stub nds.

Bolt Dimensions for 400 and 600 LB. Steel Flange

Nom. Pipe Size	400 Lb. Flange				600 Lb. Flange			
	Bolt Circle Diameter	Bolt Diameter	Number of Bolts	*Stud Length	Bolt Circle Diameter	Bolt Diameter	Number of Bolts	*Stud Length
½	2⅝	½	4	3	2⅝	½	4	3
¾	3¼	⅝	4	3½	3¼	⅝	4	3½
1	3½	⅝	4	3½	3½	⅝	4	3½
1¼	3⅞	⅝	4	3¾	3⅞	⅝	4	3¾
1½	4½	¾	4	4¼	4½	¾	4	4¼
2	5	⅝	8	4¼	5	⅝	8	4¼
2½	5⅞	¾	8	4¾	5⅞	¾	8	4¾
3	6⅝	¾	8	5	6⅝	¾	8	5
3½	7¼	⅞	8	5½	7¼	⅞	8	5½
4	7⅞	⅞	8	5½	8½	⅞	8	5¾
5	9¼	⅞	8	5¾	10½	1	8	6½
6	10⅝	⅞	12	6	11½	1	12	6¾
8	13	1	12	6¾	13¾	1⅛	12	7¾
10	15¼	1⅛	16	7½	17	1¼	16	8½
12	17¾	1¼	16	8	19¼	1¼	20	8¾
14	20¼	1¼	20	8¼	20¾	1⅜	20	9¼
16	22½	1⅜	20	8¾	23¾	1½	20	10
18	24¾	1⅜	24	9	25¾	1⅝	20	10¾
20	27	1½	24	9¾	28½	1⅝	24	11½
22	29¼	1⅝	24	10	30⅝	1¾	24	12
24	32	1¾	24	11	33	1⅞	24	13¼
26	34½	1¾	28	11½	36	1⅞	28	13¼
30	39¼	2	28	13	40¼	2	28	14
34	43½	2	28	13¾	44½	2¼	28	15
36	46	2	32	14	47	2½	28	15¾
42	48¼	1⅞	32	15¼	50½	2½	28	19¼

*¼" Raised Face.
Stud lengths for lap joint flanges are equal to lengths shown minus ½" plus the thickness of two laps of the stub ends.

Bolt Template for Drilling Flanged Fittings

Pipe Size	Flange Dia.	Min. Flange Thickness	Bolt Circle Dia.	No. of Bolts	Bolt Hole Dia.	Dia. of Bolt	Length of Bolt	Ring Gasket I.D.	Ring Gasket O.D.
NPS/DN	In./mm	In./mm	In./mm		In./mm	In./mm	In./mm	In./mm	In./mm
¾ 20	3⅞ 98	7/16 11	2¾ 70	4	⅝ 16	½ 13	1¾ 44	1 1/16 27	2¼ 57
1 25	4¼ 108	7/16 11	3⅛ 79	4	⅝ 16	½ 13	1¾ 44	1 5/16 33	2⅝ 67
1¼ 32	4⅝ 117	½ 13	3½ 89	4	⅝ 16	½ 13	2 51	1 21/32 42	3 76
1½ 40	5 127	9/16 14	3⅞ 98	4	⅝ 16	½ 13	2 51	1 29/32 48	3⅜ 86
2 50	6 152	⅝ 16	4¾ 121	4	¾ 19	⅝ 16	2¼ 57	2⅜ 60	4⅛ 105
2½ 65	7 178	11/16 17	5½ 140	4	¾ 19	⅝ 16	2½ 64	2⅞ 73	4⅞ 124
3 80	7½ 191	¾ 19	6 152	4	¾ 19	⅝ 16	2½ 64	3½ 89	5⅜ 137
3½ 90	8½ 216	13/16 22	7 178	8	¾ 19	⅝ 16	2¾ 70	4 102	6⅜ 162
4 100	9 229	15/16 24	7½ 191	8	¾ 19	⅝ 16	3 76	4½ 114	6⅞ 175
5 125	10 254	15/16 24	8½ 216	8	⅞ 22	¾ 19	3 76	5 9/16 141	7¾ 197
6 150	11 279	1 25	9½ 241	8	⅞ 22	¾ 19	3¼ 83	6⅝ 168	8¾ 222
8 200	13½ 343	1⅛ 29	11¾ 298	8	⅞ 22	¾ 19	3½ 89	8⅝ 219	11 279
10 250	16 406	1 3/16 30	14¼ 362	12	1 25	⅞ 22	3¾ 95	10¾ 273	13⅜ 340
12 300	19 483	1¼ 32	17 432	12	1 25	⅞ 22	3¾ 95	12¾ 324	16⅛ 410
14 O.D. 350 O.D.	21 533	1⅜ 35	18¾ 476	12	1⅛ 29	1 25	4¼ 108	14 356	17¾ 451
16 O.D. 400 O.D.	23½ 597	1 7/16 37	21¼ 540	16	1⅛ 29	1 25	4½ 114	16 406	20¼ 514
18 O.D. 450 O.D.	25 635	1 9/16 40	22¾ 578	16	1¼ 32	1⅛ 29	4¾ 121	18 457	21⅝ 549
20 O.D. 500 O.D.	27½ 699	1 11/16 43	25 635	20	1¼ 32	1⅛ 29	5 127	20 508	23⅞ 606
24 O.D. 600 O.D.	32 813	1⅞ 48	29½ 749	20	1⅜ 35	1¼ 32	5½ 140	24 610	28¼ 718

Drilling templates are in multiples of four, so that fittings may be made to face in any quarter.
Bolt holes straddle the center line.

Bolt Template for Drilling Extra Heavy Flanged Fittings

Pipe Size	Flange Dia.	Min. Flange Thickness	Dia. of Raised Face	Bolt Circle Dia.	No. of Bolts	Dia. of Bolt Holes	Bolt Dia.	Bolt Length	Gasket I.D.	Ring Gasket O.D.
NPS/DN	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm
1 25	4⅞ 124	11/16 17	2 11/16 68	3½ 89	4	¾ 19	⅝ 16	2½ 64	1 5/16 33	2⅞ 51
1¼ 32	5¼ 133	¾ 19	3 1/16 78	3⅞ 98	4	¾ 19	⅝ 16	2½ 64	1 21/32 42	3¼ 83
1½ 40	6⅛ 156	13/16 22	3 9/16 90	4½ 114	4	⅞ 22	¾ 19	2¾ 70	1 29/32 48	3¾ 95
2 50	6½ 165	⅞ 22	4 3/16 106	5 127	8	¾ 19	⅝ 16	2¾ 70	2⅜ 60	4⅜ 111
2½ 65	7½ 191	1 25	4 15/16 125	5⅞ 149	8	⅞ 22	¾ 19	3¼ 83	2⅞ 73	5⅛ 130
3 80	8¼ 210	1⅛ 29	5 11/16 144	6⅝ 168	8	⅞ 22	¾ 19	3½ 89	3½ 89	5⅞ 149
3½ 90	9 229	1 3/16 30	6 5/16 160	7¼ 184	8	⅞ 22	¾ 19	3½ 89	4 102	6½ 165
4 100	10 254	1¼ 32	6 15/16 176	7⅞ 200	8	⅞ 22	¾ 19	3¾ 95	4½ 114	7⅛ 181
5 125	11 279	1⅜ 35	8 5/16 211	9¼ 235	8	⅞ 22	¾ 19	4 102	5 9/16 141	8½ 216
6 150	12½ 318	1 7/16 37	9 11/16 246	10⅝ 270	12	⅞ 22	¾ 19	4 102	6⅝ 168	9⅞ 251
8 200	15 381	1⅝ 41	11 15/16 303	13 330	12	1 25	⅞ 22	4½ 114	8⅝ 219	12⅛ 308
10 250	17½ 445	1⅞ 48	14 1/16 357	15¼ 387	16	1⅛ 29	1 25	5¼ 133	10¾ 273	14¼ 362
12 300	20½ 521	2 51	16 7/16 418	17¾ 451	16	1¼ 32	1⅛ 29	5½ 140	12¾ 324	16⅝ 422

Drilling templates are in multiples of four, so that fittings may be made to face in any quarter.
Bolt holes straddle the center line.

Coated Arc Welding Electrodes — Types & Styles

A. W. S. Classification

E60**10** **Direct Current, Reverse polarity, All Positions.** All purpose. Moderately smooth finish. Good penetration. This is the electrode used for most carbon steel pipe welding.

E60**11** **Alternating Current, All Positions.** All purpose. Moderately smooth finish. Good penetration. AC or DC or DC Reverse Polarity

E60**12** **Direct Current, Straight Polarity, All Positions.** High bead. Smooth. Fast. "Cold rod".

E60**13** **Alternating Current, All Positions.** High bead. Smooth. Fast. "Cold rod". AC, DC Reverse, DC Straight

E60**18** **Direct Current, All Positions.** "Low hydrogen" iron powder electrodes. AC or DC Reverse Polarity

E60**20** **Direct Current, Straight Polarity, Flat & Horizontal Fillet.** Flat bead. Smooth. Fast. Deep penetration. Can be used with A.C. also. "Hot rod".

E60**27** "Iron powder electrodes". Flat and Horizontal Fillet, AC or DC Straight

Note: This information also applies to E70, E80, E90, and E100 Series. The last two numbers **(in bold type)** designate the types or styles and the first two numbers the minimum specified tensile strength in 1,000 psi of the weld deposit as welded.

Physical Properties of E60 & E70 Series Electrodes

Typical Values

AWS ASTM Electrode	Tensile Strength	Yield Strength	Elongation	Red. in Area Min. %
E6010	62,000–70,000	52,000–58,000	22 to 28%	35
E6011	62,000–73,000	52,000–61,000	—	—
E6012	68,000–78,000	55,000–65,000	17 to 22%	25

Minimum Values

AWS ASTM Electrode	Tensile Strength	Yield Strength	Elongation
E7010	70,000	57,000	22
E7011	70,000	57,000	22
E7015	70,000	57,000	22
E7016	70,000	57,000	22
E7020	70,000	52,000	25

Carbon Steel Welding ..... 2700–2790°F
Stainless Steel Welding ..... 2490–2730°F
Cast Iron Welding ..... 1920–2500°F
Copper Welding and Brazing ..... 1980°F
Brazing Copper-Silicon with Phosphor-Bronze ..... 1850–1900°F
Brazing Naval Bronze with Manganese Bronze ..... 1600–1700°F
Silver Solder ..... 1175–1600°F
Low Temperature Brazing ..... 1175–1530°F
Soft Solder ..... 200–730°F
Wrought Iron ..... 2700–2750°F

Basic Arc & Gas Welding Symbols

Basic Weld Symbols

Back	Fillet	Plug or Slot	Groove or Butt						
			Square	V	Bevel	U	J	Flare V	Flare Bevel

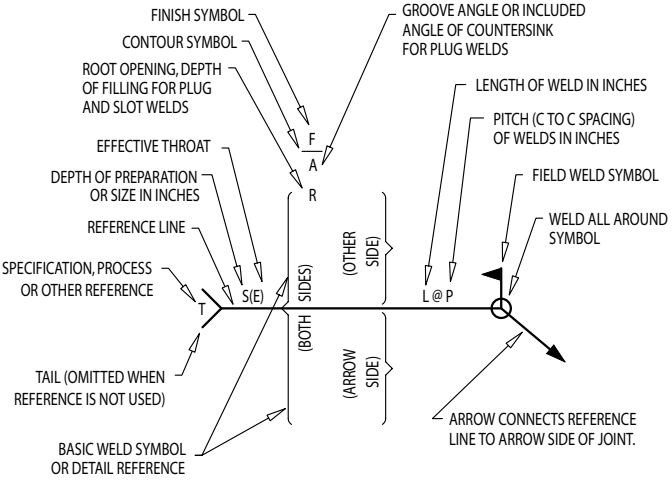
Supplementary Weld Symbols

Backing	Spacer	Weld All-Around	Field Weld	Contour		See AWS A2.4 for a detailed review of standard welding symbols
				Flush	Convex	

Notes:

1. In plan or elevation, near, far, and both sides, locations refer to nearest member parallel to plane of drawing and not to others farther behind.
2. In section or end views only, when weld is not drawn, the side to which arrow points is considered near side.
3. Welds on both sides are of same size unless otherwise shown.
4. Symbols govern to break in continuity of structure or to extent of hatching or dimension lines.
5. Tail of arrow used for specification reference.
6. All welds are continuous and of user's standard proportions and all except V-grooved and bevel-grooved welds are closed unless otherwise shown.
7. When welds are drawn in section or end views, obvious information is not given by symbol.
8. In joints in which one member only is to be grooved, arrows point to that member.

Basic Arc & Gas Welding Symbol Notes



Notes:

1. Size, weld symbol, length of weld and spacing must read in that order from left to right along the reference line. Neither orientation of reference line nor location of the arrow alter this rule.
2. The perpendicular leg of ◺, ◸, ◹, ◿ weld symbols must be at left.
3. Arrow and other side welds are of the same size unless otherwise shown. Dimensions of fillet welds must be shown on both the arrow side and other side symbol.
4. The point of the field weld symbol must point toward the tail.
5. Symbols apply between abrupt changes in direction of welding unless governed by the "All Around" symbol or otherwise dimensioned.

Decimal Equivalents of Fractions (in/mm)

Inches		Metric	Inches		Metric
Fractional	Decimal	mm	Fractional	Decimal	mm
1/64	.0156	0.3969	5/9	.6250	15.8750
1/32	.0313	0.7938	41/64	.6406	16.2719
3/64	.0469	1.1906	21/32	.6563	16.6688
1/16	.0625	1.5875	43/64	.6719	17.0656
5/64	.0781	1.9844	11/16	.6875	17.4625
3/32	.0938	2.3813	45/64	.7031	17.8594
7/64	.1094	2.7781	23/32	.7188	18.2563
1/8	.1250	3.1750	47/64	.7344	18.6531
9/64	.1406	3.5719	3/4	.7500	19.0500
5/32	.1563	3.9688	49/64	.7656	19.4469
11/64	.1719	4.3656	25/32	.7813	19.8438
3/16	.1875	4.7625	51/64	.7969	20.2406
13/64	.2031	5.1594	13/16	.8125	20.6375
7/32	.2188	5.5563	55/64	.8281	21.0344
15/54	.2344	5.9531	27/32	.8438	21.4313
1/4	.2500	6.3500	55/64	.8594	21.8281
17/64	.2656	6.7469	7/8	.8750	22.2250
9/32	.2813	7.1438	57/64	.8906	22.6219
16/64	.2969	7.5406	29/32	.9063	23.0188
5/16	.3125	7.9375	59/64	.9219	23.4156
21/24	.3281	8.3344	15/16	.9375	23.8125
11/32	.3438	8.7313	61/64	.9531	24.2094
23/64	.3594	9.1281	31/32	.9688	24.6063
3/8	.3750	9.5250	63/64	.9844	25.0031
25/64	.3906	9.9219	1	1.000	25.4000
13/32	.4063	10.3188	1¼	1.250	31.7500
27/64	.4219	10.7156	1½	1.500	38.1000
7/16	.4375	11.1125	1¾	1.750	44.4500
29/64	.4531	11.5094	2	2.000	50.8000
15/32	.4688	11.9063	2½	2.500	63.5000
31/64	.4844	12.3031	3	3.000	76.2000
½	.5000	12.7000	3½	3.500	88.9000
33/64	.5156	13.0969	4	4.000	101.6000
17/32	.5313	13.4938	5	5.000	127.0000
35/64	.5469	13.8906	6	6.000	152.4000
9/16	.5625	14.2875	8	8.000	203.2000
37/64	.5781	14.6844	10	10.000	254.0000
19/32	.5938	15.0813	12	12.000	304.8000

Minutes Converted to Decimals of a Degree

Minutes	Degree
1	.0166
2	.0333
3	.0500
4	.0666
5	.0833
6	.1000
7	.1166
8	.1333
9	.1500
10	.1666
11	.1833
12	.2000
13	.2106
14	.2333
15	.2500
16	.2666
17	.2833
18	.3000
19	.3166
20	.3333
21	.3500
22	.3666
23	.3833
24	.4000
25	.4166
26	.4333
27	.4500
28	.4666
29	.4833
30	.5000

Minutes Converted to Decimals of a Degree (Continued)

Minutes	Degree
31	.5166
32	.5333
33	.5500
34	.5666
35	.5833
36	.6000
37	.6166
38	.6333
39	.6500
40	.6666
41	.6833
42	.7000
43	.7166
44	.7333
45	.7500
46	.7666
47	.7833
48	.8000
49	.8166
50	.8333
51	.8500
52	.8666
53	.8833
54	.9000
55	.9166
56	.9333
57	.9500
58	.9666
59	.9833
60	1.0000

Standard Conversions

To Change	To	Multiply By
Inches	Feet	0.0833
	Millimeters	25.4
Feet	Inches	12
	Yards	0.3333
Yards	Feet	3
Square Inches	Square feet	0.00694
Square feet	Square inches	144
	Square yards	0.11111
Square yards	Square feet	9
Cubic Inches	Cubic feet	0.00058
Cubic feet	Cubic inches	1728
	Cubic yards	0.03703
Cubic yards	Cubic feet	27
Cubic Inches	Gallons	0.00433
Cubic feet	Gallons	7.48
Gallons	Cubic inches	231
	Cubic feet	0.1337
	Pounds of water	8.33
Pounds of water	Gallons	0.12004
Ounces	Pounds	0.0625
Pounds	Ounces	16
Inches of water	Pounds per square inch	0.0361
	Inches of mercury	0.0735
	Ounces per square inch	0.578
	Pounds per square foot	5.2
Inches of mercury	Inches of water	13.6
	Feet of water	1.1333
	Pounds per square inch	0.4914
Ounces per square inch	Inches of mercury	0.127
	Inches of water	1.733
Pounds per square inch	Inches of water	27.72
	Feet of water	2.31
	Inches of mercury	2.04
	Atmospheres	0.0681
Feet of water	Pounds per square inch	0.434
	Pounds per square foot	62.5
	Inches of mercury	0.8824
Atmospheres	Pounds per square inch	14.696
	Inches of mercury	29.92
	Feet of water	34
Long tons	Pounds	2240
Short tons	Pounds	2000
	Long tons	0.89285

Unit Conversion	
Flow	
1 gpm =	0.134 cu. ft. per min
	500 lb.per hr. x sp. gr.
500 lb. per hr. =	1 gpm / sp. gr.
1 cu. ft. per min. (cfm) =	448.8 gal. per hr. (gph)
Power	
1 Btu per hr. =	0.293 watt
	12.96 ft. lb. per min.
	0.00039 hp
1 ton refrigeration = (U.S.)	288,000 Btu per 24 hr.
	12,000 Btu per hr.
	200 Btu per min.
	83.33 lb. ice melted per 24hr. from and at 32°F
	2,000 lb. ice melted per24hr. from and at 32°F
1 hp =	550 ft. lb. per sec.
	746 watt
	2,545 Btu per hr.
1 boiler hp =	33,480 Btu per hr.
	34.5 lb. water evap. per hr. from & at 212°F
	9.8 kw.
1 kw. =	3,413 Btu per hr.
Mass	
1 lb. (avoir.) =	16 oz. (avoir.)
	7,000 grain
1 ton (short) =	2,000 lb.
1 ton (long) =	2,240 lb.
Pressure	
1 lb. per sq. in. =	3.13 ft. water at 60°F
	2.04 in. hg at 60°F
1 ft. water at 60°F =	.433 lb. per sq. in.
	.884 in. hg at 60°F
1 in. Hg at 60°F =	.49 lb. per sq. in.
	1.13 ft. water at 60°F

Unit Conversion (Continued)

Temperature	
°C =	(°F-32) x 5/9
Volume	
1 gal. (U.S.) =	128 fl. oz. (U.S.)
	231 cu. in.
	.833 gal. (Brit.)
1 cu. ft. =	7.48 gal. (U.S.)
Weight of Water	
1 cu. ft. at 50°F. =	62.41 lb.
1 gal. at 50°F. =	8.34 lb.
1 cu. ft. of ice =	57.2 lb.
1 cu. ft. at 39.2°F. =	62.43 lb.
Water is at its greatest density at 39.2°F	
Weight of Liquid	
1 gal. (U.S.) =	8.34 lb. x sp. gr.
1 cu. ft. =	62.4 lb. x sp. gr.
1 lb. =	.12 U.S. gal. / sp. gr.
	.016 cu. ft. / sp. gr.
Work	
1 Btu (mean) =	778 ft. lb.
	.293 watt hr.
	$^{1}/_{180}$ of heat required to change temp of 1 lb. water from 32°F to 212°F
1 hp-hr =	2545 Btu (mean)
	.746 kwhr
1 Kwhr =	3413 Btu (mean)
	1.34 hp-hr

Merit® Adjustable Drop Nipple

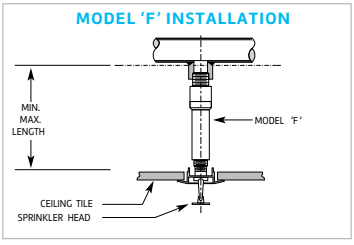
Installation

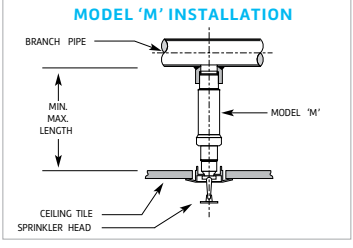
a) For use in wet and dry pipe automatic sprinkler systems installed in accordance with all applicable standards or codes. (See item 4)

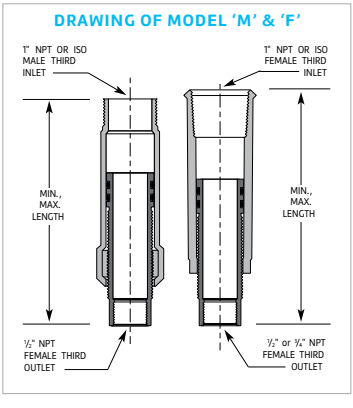
b) Before starting the job of making sprinklers into steel threads of the above fittings, count the number of fully developed male threads on the brand of sprinkler to be installed into the fittings. If seven (7) perfect threads are counted, the sprinkler should thread into the ¾" or ¼" thread from three (3) to four (4) threads hand tight. If five (5) to six (6) threads are counted, the sprinkler should thread into the ¾" or ¼" thread from two (2) to three (3) threads hand tight.

c) The use of an anaerobic pipe thread sealant is preferred for thread make up when connecting to another pipe fitting or nipple. If attaching a sprinkler head, please refer to the manufacturer's installation instructions and apply pipe thread sealant only to male threads of the sprinkler.

d) If either of the above fails to allow the sprinkler to make-up to a minimum of from five (5) to six (6) full threads, do not over tighten the sprinkler. Instead back the sprinkler out of the fitting. Clean any debris and /or pipe sealant from both the male and female threads. Gauge both the male threads of the sprinkler and the female threads of the Adjustable Drop Nipple for compliance with ANSI B1.2.1. Specification for Tapered Pipe Threads. The same procedure would apply if a leak has been detected. If within tolerance, reapply the anaerobic pipe sealant and make-on to the required length. Allow twenty-four hours for setting.







WARNING: Adjustable Drop Nipples described herein must be installed and maintained in compliance with this document as well as the applicable standards of the National Fire Protection Association in addition to the standards for any other authorities having jurisdiction. **DO NOT USE ANY PETROLEUM BASED LUBRICANTS ON THE O-RING SEALS.** Petroleum based lubricants are incompatible with EPDM and will impair serviceability of the unit.

Merit® Adjustable Drop Nipple (Continued)

Installation (Continued)

e) Connect the Adjustable Drop Nipple assembly to the sprinkler system by wrenching on the make-up area on the Drop Nipple. **DO NOT WRENCH ON THE BARREL PORTION OF THE UNIT OR SPRINKLER.** Damage to the Adjustable Drop Nipple or Sprinkler may result.

f) After the ceiling has been installed adjust the sprinkler to its final position by using the sprinkler wrench and assemble the escutcheon plate to the inner support ring. It is recommended that the system pressure be relieved when adjusting, however it is not necessary to drain the system.

1. General Description

Merit Eliminator Adjustable Drop Nipples Models "M" and "F" are the screw type consisting of an outer case which has one (1) inch N.P.T. or ISO-7 male or female thread on the inlet, and an inner case which has either a one-half inch (¾") or a three-quarter inch (¼") N.P.T. sprinkler connection. The inner case employs O-Ring Seals and adjusts either in or out over the range of the adjustment. Merit Eliminator Adjustable Drop Nipples are designed for use in automatic fire sprinkler systems installed in accordance with all applicable standards or codes. (See item 4). The purpose of these fittings is to allow for the final adjustment of the drop nipple between a branch line and a pendant sprinkler by eliminating the need to re-cut the existing drop nipple in order to fit-up flush to the ceiling. Merit Eliminator Adjustable Drop Nipples do not require any secondary locking following final adjustment and they will not extend as a result of vibrations or pressure surges in the system.

2. Approvals & Standards

Merit Eliminator Adjustable Drop Nipples are listed by the Underwriters Laboratories, Inc. (UL Listing Number 57SO) and approved by the Factory Mutual Research Corporation (FM). In addition, Model "M" and "F" Adjustable Drop Nipples are approved by the New York Board of Materials and Equipment Standard (BSA-886-86-5A) and verband der Schadenversicherer e.V., (Vds).

3. Technical Data

Merit Adjustable Drop Nipples are rated for use at a maximum temperature of 300°F, and a maximum service pressure of 300 psi. The approximate friction loss based on the Hazen and Williams Formula expressed in equivalent length of one (1) inch, schedule 40 pipe (where C= 120) is 1' for ¾" outlet Model "M", 2.6' for ¼" outlet Model "M", 4.2' for F1, 1.3' for F2, 1.5' for F3.150, and 2.9' for F3.175. Merit Eliminator Drop nipples maximum sprinkler orifice size for Models M3.150, ME3.150, M1.150, and F3.150 is $^{17}/_{32}$" and Models F1.150, F2.150 and F3.175 is $^{5}/_{8}$". The inlet and outlet threads conform to ANSI B1.20.1 / ISO-7R/RC. The O-Ring seals used in the manufacture are an ethylene propylene elastomer (EPDM). The outer and inner casings are manufactured from high strength carbon Steel. All Model "M" and "F" Adjustable Drop Nipples are hydrostatically tested for O-ring integrity prior to shipment.

4. Warning

Adjustable Drop Nipples described herein must be installed and maintained in compliance with this document as well as the applicable standards of the National Fire Protection Association in addition to the standards for any other authorities having jurisdiction. **DO NOT USE ANY PETROLEUM BASED LUBRICANTS ON THE O-RING SEALS.** Petroleum based lubricants are incompatible with EPDM and will impair serviceability of the unit.

Merit® Tee-Let (Welding Outlet Fitting)

Tee-Let Welded Outlet Fitting
(UL VIZU – EX3788 FM Approval Guide Chapter 1 – Pipe Fittings)

Outlet Model	Outlet Pipe Size	Header Pipe Size**	Rated Pressure
	In.	In.	psig
Tee-Let Type A (F-Threaded End)	½, ¾, 1, 1¼, 1½, 2, 2½, 3, 4	1¼–8	300
Tee-Let Type C (Grooved End)	1¼–8	1¼–8	300
Tee-Let Type C/R (Roll Grooved End)	1¼–6	1¼–8	300

**Contact your local ASC Engineered Solutions™ Representative for a complete list of UL approved proprietary flow pipe and sizes.

Note: Tee-Lets are manufactured to fit size-on-size, that is the contoured shape on a given Tee-Let is made to fit perfectly on the first listed header size. If installed on the second header size marked on the fitting, a slight gap of approximately 1/32" - 1/16" (depending on size) will appear along the longitudinal centerline of the header. For example, a 1" x 2 - 2½" Tee-Let, is a 1" outlet fitting manufactured to fit perfectly on the 2" header size listed, while leaving a 1/32" - 1/16" (depending on size) gap along the longitudinal centerline of the 2½" size. If a perfect fit is required for a 2½" header pipe, then a 1" x 2½ - 3" Tee-Let would be ordered. Size consolidations are employed to reduce inventory and provide for greater flexibility.

Thread Make-Up and Installation

A) For use in systems installed in accordance with all applicable standards or codes. (See Section III, Item C)

B) Prior to installing sprinkler, ensure that no dirt, weld spatter or damage is in the threads. Then count the number of fully developed male threads on the nipple or sprinkler to be installed into the fittings. Compare number of threads counted to the number of required fully developed threads as shown in the thread chart located on the back of this sheet. If thread count is correct, proceed with installation (Step C), if thread count does not match, check nipple or sprinkler for proper thread gage measurement and discard if not to ASME B1.20.1

C) The use of an anaerobic pipe thread sealant is preferred for thread make up when connecting to another pipe fitting or nipple. If attaching a sprinkler head, please refer to the manufacturer's installation instructions and apply pipe thread sealant only to male threads of the sprinkler.

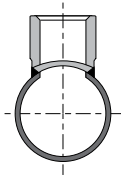
D) If either of the above fails to allow the sprinkler or nipple to assemble to a minimum of full threads, do not over tighten. Instead back the sprinkler or nipple out of the fitting. Clean any debris and / or pipe sealant from both the male and female threads. Gauge both the male threads of the sprinkler or nipple and the female threads of the Tee-Let for compliance with ASME B1.20.1. Specification for Tapered Pipe Threads. The same procedure would apply if a leak has been detected.

If within tolerance, reapply the anaerobic pipe sealant or Teflon™ tape and make-on to the required length. Allow twenty-four hours for setting.

Merit® Tee-Let (Welding Outlet Fitting) (Continued)

Unified Design Series

Merit's Unified Design Series carries all important design considerations into its entire line of welding branch outlet fittings. Merit Weld-Miser Tee-Lets are designed and manufactured to reduce the amount of weld required to install the Tee-Lets on thin wall or proprietary flow pipe. Typically only one weld-pass completes the installation. Merit Tee-Lets install with less weld volume than any other brand of welding outlet fittings for fire sprinkler applications.



To Accomplish This:

- The contoured end of the fittings employs a reduced outside diameter. Two major advantages are immediately apparent:
- The thinner wall on the contoured end permits welding temperatures to be matched to the thickness of the branch line or main thereby insuring complete penetration without cold welds, weld roll-off, burnthrough or excessive distortion.
- On smaller sizes a heavier section is maintained on the threaded end of the fitting. This protects the threads from damage during shipping and handling prior to installation as well as from weld distortion.
- Each outlet size 1¾" and larger, whether male or female threaded, cut grooved or beveled requires the same hole size in the header pipe. This simplifies the installation process.

General Specifications

- Tee-Let welding outlet fittings are manufactured from highly weldable steel which conforms to the chemical and physical requirements of ASTM A-53, Grades A or B, Type E. Ease of installation is assured when automatic welding equipment is used to install Merit Tee-Lets.
- Threads are cut in accordance with ASME B1.20.1 for NPT tapered pipe threads. ISO 7/1 taper threads are available upon request.
- Tee-Let threaded and grooved welding outlet fittings are UL/ULC Listed and FM Approved for use in the fire sprinkler systems installed in accordance with the requirements of NFPA 13.
- Tee-Lets are offered in a wide variety of header sizes. The consolidated header sizes shown in the following charts allow the fittings to be installed on more than one header size, permitting the first size listed to fit the header perfectly, while a small gap along the longitudinal center line of the header will appear for the second size listed.
- Merit Weld-Miser Tee-Lets are identified by a lot number that provides full traceability per ISO 9000 specifications.

For Your Piping System Specify Weld-Miser Tee-Let

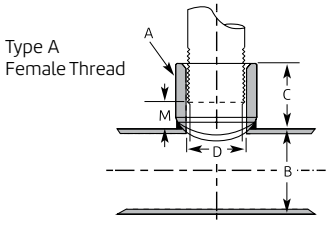
Branch Outlet Fittings shall be Merit Weld-Miser Tee-Let, Lightweight steel, employing low weld volume profile to provide for full penetration welds with minimum burn through and distortion on Schedules 5 thru 40 and proprietary thin wall pipe. Threads may be NPT per ASME B1.20.1 or ISO 7/1 taper, and the bore of the fittings calculated to improve flow. Welding outlets to be UL Listed, FM Approved for use conforming to NFPA 13 and pressure rated for 300 psi maximum.

CAUTION: Merit Type A Tee-Lets described herein must be installed and maintained in compliance with this document as well as the applicable standards of the National Fire Protection Association in addition to the standards of any other authorities having jurisdiction.

For Listings / Approval Details and Limitations, visit our website at www.asc-es.com or contact an ASC Sales Representative.

**Hole sizes are recommendations only. Fabricator / installer must account for different cutting methods to comply with applicable codes and regulations.

Merit® Weld-Miser Tee-Let – Type A



Weld-Miser Tee-Let - Type A

Nominal Outlet A	Nominal Header B	Outlet Length C	Inside Diameter D	Make Up M	Weight Each
In./mm	In./mm	In./mm	In./mm	In./mm	Lbs./kg
¼ x 6 x	1¼–8 6–200				0.080 0.04
½ x 13 x	1¼–2 32–50	1.063 27.0	0.700 17.8	0.500 12.7	0.171 0.08
	2 - 2½ 50 - 65	1.063 27.0	0.700 17.8	0.500 12.7	0.171 0.08
	2½–8 65–200	1.063 27.0	0.700 17.8	0.500 12.7	0.169 0.08
¾ x 19 x	1¼–2 32–50	1.125 28.6	0.900 22.9	0.500 12.7	0.260 0.12
	2–2½ 50–65	1.125 28.6	0.900 22.9	0.500 12.7	0.260 0.12
	2½–8 65–200	1.125 28.6	0.900 22.9	0.500 12.7	0.256 0.12
1 x 25 x	1¼–1½ 32–40	1.250 31.8	1.145 29.1	0.500 12.7	0.331 0.15
	1½–2 40 - 50	1.250 31.8	1.145 29.1	0.500 12.7	0.331 0.15
	2–2½ 50–65	1.250 31.8	1.145 29.1	0.500 12.7	0.320 0.15
	2½–4 65–100	1.250 31.8	1.145 29.1	0.500 12.7	0.309 0.14
	5–8 125–200	1.250 31.8	1.145 29.1	0.500 12.7	0.291 0.13
1¼ x 32 x	1½–2 40–50	1.375 34.9	1.490 37.8	0.500 12.7	0.421 .019
	2–2½ 50–65	1.375 34.9	1.490 37.8	0.500 12.7	0.421 .019
	2½–3 65–80	1.375 34.9	1.490 37.8	0.500 12.7	0.411 .019
	3–4 80–100	1.375 34.9	1.490 37.8	0.500 12.7	0.389 .018
	5–8 125–200	1.375 34.9	1.490 37.8	0.500 12.7	0.389 .018

Merit® Weld-Miser Tee-Let — Type A (Continued)

Weld-Miser Tee-Let - Type A (Continued)

Nominal Outlet A	Nominal Header B	Outlet Length C	Inside Diameter D	Make Up M	Weight Each
In./mm	In./mm	In./mm	In./mm	In./mm	Lbs./kg
1½ x 40 x	1½ 40	1.625 41.3	1.610 40.9	0.875 22.2	0.477 .022
	2 50	1.625 41.3	1.610 40.9	0.875 22.2	0.477 .022
	2½ 65	1.625 41.3	1.610 40.9	0.875 22.2	0.477 .022
	3–4 80–100	1.625 41.3	1.610 40.9	0.875 22.2	0.477 .022
	4 100	1.625 41.3	1.610 40.9	0.875 22.2	0.477 .022
	5–8 125–200	1.625 41.3	1.610 40.9	0.875 22.2	0.477 .022
2 x 50 x	2 50	1.750 44.5	2.067 52.5	0.875 22.2	0.857 0.38
	2½ 65	1.750 44.5	2.067 52.5	0.875 22.2	0.829 0.38
	3 80	1.750 44.5	2.067 52.5	0.875 22.2	0.829 0.39
	4 100	1.750 44.5	2.067 52.5	0.875 22.2	0.800 0.36
	5 125	1.750 44.5	2.067 52.5	0.875 22.2	0.743 0.34
	6 150	1.750 44.5	2.067 52.5	0.875 22.2	0.743 0.34
	8 200	1.750 44.5	2.067 52.5	0.875 22.2	0.743 0.34
2½ x 65 x	2½ 65	2.215 54.0	2.469 62.7	1.125 28.6	1.250 0.55
	3 80	2.215 54.0	2.469 62.7	1.125 28.6	1.200 0.55
	4 100	2.215 54.0	2.469 62.7	1.125 28.6	1.150 0.52
	5 125	2.215 54.0	2.469 62.7	1.125 28.6	1.150 0.52
	6 150	2.215 54.0	2.469 62.7	1.125 28.6	1.150 0.52
	8 200	2.215 54.0	2.469 62.7	1.125 28.6	1.150 0.52
3 x 80 x	3 80	2.500 63.5	3.068 77.9	1.500 38.1	1.750 0.79
	4 100	2.500 63.5	3.068 77.9	1.500 38.1	1.700 0.77
	5 125	2.500 63.5	3.068 77.9	1.500 38.1	1.700 0.77
	6 150	2.500 63.5	3.068 77.9	1.500 38.1	1.650 0.75
	8 200	2.500 63.5	3.068 77.9	1.500 38.1	1.650 0.75

General Assembly of Threaded Fittings Installation and Assembly

1) Inspect both Male and Female Components Prior to Assembly

- Threads should be free from mechanical damage, dirt, chips and excess cutting oil.
- Clean or replace components as necessary.

2) Application of Pipe Dope

- Use a pipe dope that is fast drying, sets-up to a semi hard condition and is vibration resistant. Alternately, an anaerobic sealant may be utilized.
- Thoroughly mix the thread sealant prior to application.
- Apply a thick even coat to the male threads only. Best application is achieved with a brush stiff enough to force sealant down to the root of the threads.

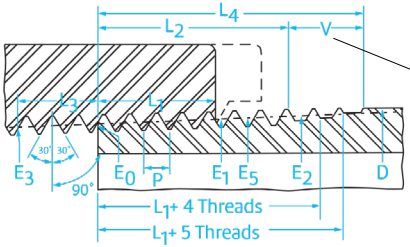
3) Joint Make-Up

- For sizes up to and including 2" pipe, wrench tight makeup is considered three full turns past handtight. Handtight engagement for ½" through 2" thread varies from 4½ turns to 5 turns.
- For 2½" through 4" sizes, wrench tight makeup is considered two full turns past handtight. Handtight engagement for 2½" through 4" thread varies from 5½ turns to 6¾ turns.

Pipe Nipple Thread Engagement

Pipe Nipple Thread Engagement (Normal for Tight Joints)

Pipe Size	Length
⅛	¼
¼	⅜
⅜	⅜
½	½
¾	9/16
1	11/16
1¼	11/16
1½	11/16
2	¾
2½	15/16
3	1
3½	1 1/16
4	1⅛
5	1¼
6	1 5/16

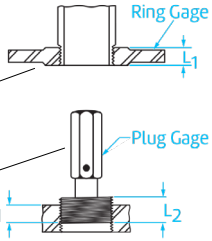


0.8P = Thread Depth – Amer. Std.
0.760P = Thead Depth – A.P.I. Std.
Total Taper ¾" per Foot
(Measured on Diameter)

Imperfect threads due to lead or die

Gage to go on flush by hand – standard tolerance is ± one turn.

Plug gage to enter until notch is flush with first thread – standard tolerance is + one thread.



National Pipe Thread Standards

Nominal Pipe Size	Outside Diameter of Pipe	Threads per Inch	Pitch of Thread	Pitch Diameter at Beginning of External Threads	Handtight Engagement		Effective Thread External		Wrench Make-up Length for Internal Thread		Overall Length External Thread
					Length	Pitch Diameter	Length	Pitch Diameter	Length	Pitch Diameter	
	D	N	P	E_0	L_1 ††	E_1	L_2 †	E_2	L_3	E_3	L_4
⅛	.405	27	.0370	.3635	.180**	.3748**	.2639	.3800	.1111	.3566	.3924
¼	.540	18	.0556	.4774	.200**	.4899**	.4018	.5025	.1667	.4670	.5946
⅜	.675	18	.0556	.6120	.240	.6270	.4078	.6375	.1667	.6016	.6006
½	.840	14	.0714	.7584	.320	.7784	.5337	.07918	.2143	.7450	.7815
¾	1.050	14	.0714	.9677	.339	.9889	.5457	1.0018	.2143	.9543	.7935
1	1.315	11½	.0870	1.2136	.400	1.2386	.6828	1.2563	.2609	1.1973	.9845
1¼	1.660	11½	.0870	1.5571	.420	1.5834	.7068	1.6013	.2609	1.5408	1.0085

National Pipe Thread Standards (Contineed)

Nominal Pipe Size	Outside Diameter of Pipe	Threads per Inch	Pitch of Thread	Pitch Diameter at Beginning of External Threads	Handtight Engagement		Effective Thread External		Wrench Make-up Length for Internal Thread		Overall Length External Thread
					Length	Pitch Diameter	Length	Pitch Diameter	Length	Pitch Diameter	
	D	N	P	E_0	L_1 ††	E_1	L_2 †	E_2	L_3	E_3	L_4
2½	2.875	8	.1250	2.7195	.682	2.7622	1.1375	2.7906	.2500	2.7039	1.5712
3	3.500	8	.1250	3.3406	.766	3.3885	1.2000	3.4156	.2500	3.3250	1.6337
3½	4.000	8	.1250	3.8375	.821	3.8888	1.2500	3.9156	.2500	3.8219	1.6837
4	4.500	8	.1250	4.3344	.844	4.3871	1.3000	4.4156	.2500	4.3188	1.7337
5	5.563	8	.1250	5.3907	.937	5.4493	1.4063	5.4786	.2500	5.3751	1.8400
6	6.625	8	.1250	6.4461	.958	6.5060	1.5125	6.5406	.2500	6.4305	1.9462
8	8.625	8	.1250	8.4336	1.063	8.5000	1.7125	8.5406	.2500	8.4180	2.1462
10	10.750	8	.1250	10.5453	1.210	10.6209	1.9250	10.6656	.2500	10.5297	2.3587
12	12.750	8	.1250	12.5328	1.360	12.6178	2.1250	12.6656	.2500	12.5172	2.5587
14	14.000	8	.1250	13.7750	1.562	13.8726	2.2500	13.9156	.2500	13.7594	2.6837
16	16.000	8	.1250	15.7625	1.812	15.8758	2.4500	15.9156	.2500	15.7469	2.8837
18	18.000	8	.1250	17.7500	2.000	17.8750	2.6500	17.9156	.2500	17.7344	3.0837
20	20.000	8	.1250	19.7375	2.125	19.8703	2.8500	19.9156	.2500	19.7219	3.2837
24	24.000	8	.1250	23.7125	2.375	23.8609	3.2500	23.9156	.2500	23.6969	3.6837

Data per ASME B1.20.1 – 1983 (R2006) (for Taper Pipe Thread) and API Standard 5-B (for Line Pipe Threads).

**Not according to ASME B1.20.1 – 1983 (R2006).

† Also length of plug gage.

†† Also length of ring gage and length from gaging notch to small end of pluge gage.

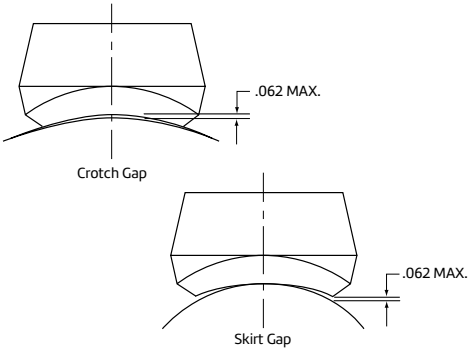
The ASME B1.20.1 National Pipe Thread Taper and the API Standard Line Pipe Thread are interchangeable. Reprinted by permission from Catalog No. 55, Ladish Co. Line pipe threads begin with a recess.

Forged Steel Anvilets – Installation and Pressure Ratings

Installation Note

Anvil Anvilets are designed to have no more than a 1/16" gap *(1.6mm)* between the base or skirt of the Anvilet when it is seated directly upon the appropriate run pipe.

However, it is recommended that the skirt of Anvilets be held slightly above the run pipe and tack welded to provide a small continuous root gap between the skirt and run pipe before completing the all-around welding beads or fillet.



Pressure Temperature Ratings

MSS Standard Practice SP-97 gives the following correlation between fitting pressure class and pipe schedule number/wall thickness designation for the calculation of pressure-temperature ratings:

Forged Steel Anvilets Pressure Temperature Ratings

Branch Connection Type	Pressure Class of Fitting	Branch Connection Size		Pipe Wall for Rating Basis
		NPS	DN	
Buttweld	STD	⅛–24	6–600	STD
	XS/XH	⅛–24	6–600	XS/XH
	SCH 160	½–6	15–150	SCH 160
Threaded	3,000	¼–4	8–100	XS/XH
	6,000	¼–2	15–50	SCH 160
Socket-Welding	3,000	½–2	15–50	XS/XH
	6,000	½–2	15–50	SCH 160

The maximum allowable pressure of a fitting is computed in accordance with the applicable piping code or regulation for straight seamless header (run) pipe or for material of equivalent composition and mechanical properties to the fitting. Any corrosion or mechanical allowances and any reduction in allowable stress due to temperature or other service conditions, must be applied to the pipe and fitting alike.

Forged Steel Fittings – Pressure Ratings

In accordance with ASME B16.11 - "Forged Fittings, Socket-Welding and Threaded" this table shows the schedule of pipe corresponding to each class of fitting for rating purposes.

Forged Steel Fittings Pressure Ratings

Class	Schedule	
	N.P.T.	S.W.
2000	80	–
3000	160	80
6000	XXS/XXH	160

ASME B16.11 states that the maximum allowable pressure of a fitting be computed in accordance with the applicable piping code or regulation for straight seamless pipe or for material of equivalent composition and mechanical properties to the fitting. Any corrosion or mechanical allowances and any reduction in allowable stress due to temperature or other service conditions must be applied to the pipe and fitting alike.

Current API Thread Standards for Oil Country Fittings

Oil Country Fittings

Current API Thread Standards

Nominal Size	O.D. Size	Pipe	Tubing & Casing	Nominal Size	O.D. Size	Pipe	Tubing & Casing
¾	1.050	14	--	--	5	--	8 Rd.
¾ EUE	1.050	--	10 Rd.	--	5½	--	8 Rd.
1	1.315	11½	10 Rd.	5	5 9/16	8V	--
1 EUE	1.315	--	10 Rd.	--	6	--	8 Rd.
1¼	1.660	11½	10 Rd.	6	6⅝	8V	8 Rd.
1½ EUE	1.660	--	10 Rd.	--	7	--	8 Rd.
1½	1.900	11½	10 Rd.	--	7⅝	--	8 Rd.
1½ EUE	1.900	--	10 Rd.	8	8⅝	8V	8 Rd.
2	2⅜	11½	10 Rd.	--	9⅝	--	8 Rd.
2 EUE	2⅜	--	8 Rd.	10	10¾	8V	8 Rd.
2½	2⅞	8V	10 Rd.	--	11¾	--	8 Rd.
2½ EUE	2⅞	--	8 Rd.	12	12¾	8V	--
3	3½	8V	10 Rd.	--	13⅜	--	8 Rd.
3 EUE	3½	--	8 Rd.	--	14	8V	--
3½	4	8V	8 Rd.	--	16	8V	8 Rd.
3½ EUE	4	8V	8 Rd.	--	18	8V	--
4	4½	8V	8 Rd.	--	20	8V	8 Rd.
4 EUE	4½	--	8 Rd.	--	--	--	--

American Standard Channels, S Shapes

American Standard Channels

Depth of Section Y	Weight per Ft.	Flange Width	Mean Thick. of Flange Z
In.	Lbs.	In.	In.
3	4.1	1 3/8	0.250
	5.0	1 1/2	
	6.0	1 5/8	
4	5.4	1 5/8	0.313
	7.25	1 3/4	
5	6.7	1 3/4	0.313
	9.0	1 7/8	
6	8.2	1 7/8	0.375
	10.5	2	
	13.0	2 1/8	
7	9.8	2 1/8	0.375
	12.25	2 1/4	
	14.75	2 1/4	
8	11.75	2 1/4	0.375
	13.75	2 3/8	
	18.75	2 1/2	
9	13.4	2 3/8	0.438
	15.0	2 1/2	
	20.0	2 5/8	
10	15.3	2 5/8	0.438
	20.0	2 3/4	
	25.0	2 7/8	
	30.0	3	
12	20.7	3	0.500
	25.0	3	
	30.0	3 1/8	
15	33.9	3 1/8	0.625
	40.0	3 1/2	
	50.0	3 3/4	
18	42.7	4	0.625
	45.8	4	
	51.9	4 1/8	
	58.0	4 1/4	

S Shapes

Depth of Section Y	Weight per Ft.	Flange Width	Mean Thick. of Flange Z
In.	Lbs.	In.	In.
3	5.7	2 1/2	0.250
	7.5	2 1/2	
4	7.7	2 5/8	0.313
	9.5	2 3/4	
5	10.0	3	0.313
	14.75	3 1/4	
6	12.5	3 3/8	0.375
	17.25	3 5/8	
7	15.3	3 5/8	0.375
	20.0	3 7/8	
8	18.4	4	0.438
	23.0	4 1/8	
10	25.4	4 5/8	0.500
	35.0	5	
12	31.8	5	0.563
	35.0	5 1/8	
	40.8	5 1/4	0.688
	50.0	5 1/2	
15	42.9	5 1/2	0.625
	50.0	5 5/8	
18	54.7	6	0.688
	70.0	6 1/4	
20	66.0	6 1/4	0.813
	75.0	6 3/8	
20.3	86.0	7	0.938
	96.0	7 1/4	
24	80.0	7	0.875
	90.0	7 1/8	
	100.0	7 1/2	

W Shapes

W Shapes

Depth of Section Y	Weight per Ft.	Flange Width	Mean Thick. of Flange Z
In.	Lbs.	In.	In.
5	19	5	0.430
6	25	6⅛	0.455
8	18	5¼	0.330
	21	5¼	0.400
	24	6½	0.400
	28	6½	0.465
	31	8	0.435
	35	8	0.495
	40	8⅛	0.560
	48	8⅛	0.685
	58	8¼	0.810
	67	8¼	0.935
10	22	5¾	0.360
	26	5¾	0.440
	30	5¾	0.510
	33	8	0.435
	39	8	0.530
	45	8	0.620
	49	10	0.560
	54	10	0.615
	60	10⅛	0.680
	68	10⅛	0.770
	77	10¼	0.870
	88	10¼	0.990
12	26	6½	0.380
	30	6½	0.440
	35	6½	0.520
	40	8	0.515
	45	8	0.575
	50	8⅛	0.640
	53	10	0.575
	58	10	0.640
	65	12	0.605
	72	12	0.670
	79	12⅛	0.735
	87	12⅛	0.810
	96	12⅛	0.900
	106	12¼	0.990

W Shapes

Depth of Section Y	Weight per Ft.	Flange Width	Mean Thick. of Flange Z
In.	Lbs.	In.	In.
14	30	6¾	0.385
	34	6¾	0.455
	38	6¾	0.515
	43	8	0.530
	48	8	0.595
	53	8	0.660
	61	10	0.645
	68	10	0.720
	74	10⅛	0.785
	82	10⅛	0.855
	90	14½	0.710
	99	14⅛	0.780
	109	14⅛	0.860
	120	14⅛	0.940
	132	14¾	1.030
16	36	7	0.430
	40	7	0.505
	45	7	0.565
	50	7⅛	0.63
	57	7⅛	0.715
	67	10¼	0.665
	77	10¼	0.760
	89	10⅜	0.875
	100	10⅜	0.985
18	50	7½	0.570
	55	7½	0.630
	60	7½	0.695
	65	7⅝	0.750
	71	7⅝	0.810
	76	11	0.680
	86	11⅛	0.770
	97	11⅛	0.870
	106	11¼	0.940

W Shapes

Depth of Section Y	Weight per Ft.	Flange Width	Mean Thick. of Flange Z
In.	Lbs.	In.	In.
21	62	8¼	0.615
	68	8¼	0.685
	73	8¼	0.740
	83	8⅜	0.835
	93	8⅜	0.930
	101	12¼	0.800
	111	12⅜	0.875
	122	12⅜	0.960
24	76	9	0.680
	84	9	0.770
	94	9⅛	0.875
	104	12¾	0.750
	117	12¾	0.850
	131	12⅞	0.960
27	94	10	0.745
	102	10	0.830
	114	10⅛	0.930
	146	14	0.975
30	108	10½	0.760
	116	10½	0.850
	124	10½	0.930
	132	10½	1.000
33	118	11½	0.740
	130	11½	0.855
	141	11½	0.960
36	135	12	0.790
	150	12	0.940
	160	12	1.020

A Typical Pipe Hanger Specification

Table 1: Maximum Horizontal Spacing Between Pipe Supports for Standard Weight Steel Pipe*

	Nominal Pipe Size (in)																				
	½	¾	1	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24	30
Max. Span (Ft) Water Service	7	7	7	9	10	11	12	13	14	16	17	19	22	23	25	27	28	30	32	33
Max. Span (Ft) Vapor Service	8	9	9	12	13	14	15	16	17	19	21	24	26	30	32	35	37	39	42	34
Recommended Hanger Rod Sizes			⅜				½			⅝		¾		⅞		1	1	1¼	1½	1¼
																	or trapeze			

The above spacing and capacities are based on pipe filled with water. Additional valves and fittings increase the load and therefore closer hanger spacing is required. *Many codes and specifications state "pipe hangers must be spaced every 10ft. regardless of size." This local specification must be followed.

Table 2: Maximum Horizontal Spacing Between Copper Tubing Supports

	Nominal Tubing Size (in)									
	½	¾	1	1¼	1½	2	2½	3	3½	4
Max. Span (Ft) Water Service	5	5	6	7	8	8	9	10	11	12
Max. Span (Ft) Vapor Service	6	7	8	9	10	11	13	14	15	16

Note: Spans shown in Tables 1 and 2 do not apply where there are concentrated loads between supports or where temperatures exceed 750°F.

Table 3: Load Carrying Capacities of Threaded Hanger Rods. Materials Carbon Steel with Minimum Actual Tensile Strength of 50 Ksi.

Rod Diameter (in)	Threads per Inch	Root Area of Coarse Thread (in²)	Maximum Safe Load (Lbs) Rod Temperature, 650° F	Maximum Safe Load (Lbs) Rod Temperature, 750° F
⅜	16 UNC	0.0678	730	572
½	13 UNC	0.126	1,350	1,057
⅝	11 UNC	0.202	2,160	1,692
¾	10 UNC	0.302	3,230	2,530
⅞	9 UNC	0.419	4,480	3,508
1	8 UNC	0.551	5,900	4,620
1¼	7 UNC	0.890	9,500	7,440
1½	6 UNC	1.29	13,800	10,807
1¾	5 UNC	1.74	18,600	14,566
2	4½ UNC	2.30	24,600	19,265
2¼	4½ UNC	3.02	32,300	25,295
2½	4 UNC	3.72	39,800	31,169
2¾	4 UNC	4.62	49,400	38,687
3	4 UNC	5.62	60,100	47,066
3¼	4 UNC	6.72	71,900	56,307
3½	4 UNC	7.92	84,700	66,331
3¾	4 UNC	9.21	98,500	77,139
4	4 UNC	10.6	114,000	88,807
4¼	4 UN	12.1	129,000	101,337
4½	4 UN	13.7	146,000	114,807
4¾	4 UN	15.4	165,000	128,982
5	4 UN	17.2	184,000	144,096

Standard UNC thread thru 4" diameter and 4-UN-2A thread series for 4¼" diameter and larger.

Gruvlok Pipe Support

When designing the hangers, supports and anchors for a grooved-end pipe system, the piping designer must consider certain unique characteristics of the grooved type coupling in addition to many universal pipe hanger and support design factors. As with any pipe system, the hanger or support system must provide for

1) the weight of the pipe, couplings, fluid & pipe system components;
2) reduce stresses at pipe joints; and
3) permit required pipe system movement to relieve stress.

The following factors should be considered when designing hangers and supports for a grooved-end pipe system.

Pipe Hanger Spacing

The following charts show the maximum span between pipe hangers for straight runs of standard weight steel pipe filled with water or other similar fluids.

Do not use these values where critical span calculations are made or where there are concentrated loads between supports.

For straight runs without concentrated loads and where full linear movement is **not** required use the table on right.

Hanger Spacing Linear Movement Not Required

Nominal Pipe Size Range	Maximum Span Between Supports
In./DNmm	Feet/meters
1 25	7 2.6
1¼–2 32-50	10 3.0
2½–4 65-100	12 3.7
5–8 125-200	14 4.3
10–12 250-300	16 4.9
14–16 350-400	18 5.5
18–24 450-600	20 6.1

Hanger Spacing

Hanger Spacing - Flexible System, Steel Pipe Full Linear Movement Is Required
Average Hangers Per Pipe Length Evenly Spaced

Nominal Pipe Size Range	Pipe Length in Feet/Meters									
In.	7	10	12	15	20	22	25	30	35	40
DNmm	2.1	3.3	3.7	4.6	6.1	6.7	7.6	9.1	10.7	12.2
1–2 25–50	1	2	2	2	3	3	4	4	5	6
2½–4 65–100	1	1	2	2	2	2	2	3	4	4
5–24 125–600	1	1	1	2	2	2	2	3	3	3

GRUVLOK
An ASC Engineered Solution

Gruvlok Pipe Support (Continued)

Hanger Spacing - Rigid Systems Suggested Maximum Span Between Supports

Nominal Size	STEEL PIPE Suggested Maximum Span Between Supports-Feet/Meters						COPPER TUBE	
	Water Service			Air Service			Water Service	Gas & Air Service
In./DNmm	*	**	***	*	**	***	**	**
1 25	7 2.1	9 2.7	12 3.7	9 2.7	10 3.0	12 3.7	–	–
1¼ 32	7 2.1	11 3.4	12 3.7	9 2.7	12 3.6	12 3.7	–	–
1½ 40	7 2.1	12 3.7	15 4.6	9 2.7	13 4	15 4.6	–	–
2 50	10 3	13 4	15 4.6	13 4	15 4.6	15 4.6	9 2.7	12 3.6
2½ 65	11 3.4	15 4.6	15 4.6	14 4.3	17 5.1	15 4.6	9 2.7	12 3.6
3 O.D. 76.1	11 3.4	15 4.6	15 4.6	14 4.3	17 5.1	15 4.6	–	–
3 80	12 3.7	16 4.8	15 4.6	15 4.6	19 5.7	15 4.6	10 3	14 4.2
3½ 90	13 4	18 5.4	15 4.6	15 4.6	21 6.3	15 4.6	–	–
4 100	14 4.3	18 5.4	15 4.6	17 5.2	21 6.4	15 4.6	12 3.7	17 5.1
4¼ O.D. 108.0	14 4.3	18 5.4	15 4.6	17 5.2	19 5.7	15 4.6	–	–
5 125	16 4.9	20 6.0	15 4.6	20 6.1	24 7.3	15 4.6	13 4	18 5.7
5¼ O.D. 133.0	15 4.6	18 5.5	15 4.6	19 5.2	22 6.6	15 4.6	–	–
5¼ O.D. 139.7	16 4.9	19 5.8	15 4.6	20 6.1	24 7.3	15 4.6	–	–
6 150	17 5.2	21 6.3	15 4.6	21 6.4	26 7.8	15 4.6	14 4.2	21 6.3
6¼ O.D. 159.0	16 4.9	20 6.0	15 4.6	20 6.1	24 7.3	15 4.6	–	–
6½ O.D. 165.1	17 5.2	21 6.3	15 4.6	21 6.4	25 7.6	15 4.6	–	–
8 200	19 5.8	23 6.9	15 4.6	24 7.3	29 8.7	15 4.6	–	–
10 250	19 5.8	25 7.5	15 4.6	24 7.3	33 9.9	15 4.6	–	–
12 300	23 7	26 7.8	15 4.6	30 9.1	36 10.8	15 4.6	–	–
14 350	23 7	26 7.8	15 4.6	30 9.1	37 11.1	15 4.6	–	–
16 400	27 8.2	26 7.8	15 4.6	35 10.7	40 12.0	15 4.6	–	–
18 450	27 8.2	27 8.1	15 4.6	35 10.7	42 12.6	15 4.6	–	–
20 500	30 9.1	27 8.1	15 4.6	39 11.9	45 13.5	15 4.6	–	–
24 600	32 9.8	26 7.8	15 4.6	42 12.8	48 14.7	15 4.6	–	–

* Spacing by ANSI-B31.1 Power Piping Code.

** Spacing by ANSI-B31.9 Building Service Piping Code, (1996 Edition), Fig. 921.1.3c, Table A, 250 psi and Fig. 921.1.3D, table A.

***Spacing by NFPA-13 Installation of Sprinkler Systems, (1999 Edition), Table 6-2.2.

ASC Engineered Solutions

PVC Pipe Support Spacing

PVC Pipe Support Spacing

Pipe Size (in.)	Schedule 40 Temperature (°F)					Schedule 80 Temperature (°F)					Schedule 120 Temperature (°F)				
	60°	80°	100°	120°	140°	60°	80°	100°	120°	140°	60°	80°	100°	120°	140°
¼	4	3½	3½	2	2	4	4	3½	2½	2	–	–	–	–	–
⅜	4	4	3½	2½	2	4½	4½	4	2½	2½	–	–	–	–	–
½	4½	4½	4	2½	2½	5	4½	4½	3	2½	5	5	4½	3	2½
¾	5	4½	4	2½	2½	5½	5	4½	3	2½	5½	5	4½	3	3
1	5½	5	4½	3	2½	6	5½	5	3½	3	6	5½	5	3½	3
1¼	5½	5½	5	3	3	6	6	5½	3½	3	6½	6	5½	3½	3½
1½	6	5½	5	3½	3	6½	6	5½	3½	3½	6½	5½	6	4	3½
2	6	5½	5	3½	3	7	6½	6	4	3½	7½	7	6½	4	3½
2½	7	6½	6	4	3½	7½	7½	6½	4½	4	8	7½	7	4½	4
3	7	7	6	4	3½	8	7½	7	4½	4	8½	8	7½	5	4½
3½	7½	7	6½	4	4	8½	8	7½	5	4½	9	8½	7½	5	4½
4	7½	7	6½	4½	4	9	8½	7½	5	4½	9½	9	8½	5½	5
5	8	7½	7	4½	4	9½	9	8	5½	5	10½	10	9	6	5½
6	8½	8	7½	5	4½	10	9½	9	6	5	11½	10½	9½	6½	6
8	9	8½	8	5	4½	11	10½	9½	6½	5½	–	–	–	–	–
10	10	9	8½	5½	5	12	11	10	7	6	–	–	–	–	–
12	11½	10½	9½	6½	5½	13	12	10½	7½	6½	–	–	–	–	–
14	12	11	10	7	6	12½	13	11	8	7	–	–	–	–	–
16	12½	11½	10½	7½	6½	14	13½	11½	8½	7½	–	–	–	–	–
18	13	12	11	8	7	14½	14	12	11	9	–	–	–	–	–
20	14	12½	11½	10	8½	15½	14½	12½	11½	9½	–	–	–	–	–
24	15	13	12½	11	9½	17	15	14	12½	10½	–	–	–	–	–
	SDR 41					SDR 26									
18	13	12	11	8	7	14½	14	12	9	8					
20	13½	12½	11½	8½	7½	15	14½	12½	9½	8½					
24	14	13	12	9	8	15½	15	13	10	9					

Note: Although support spacing is shown at 140°F, consideration should be given to the use of CPVC or continuous support above 120°F.

The possibility of temperature overrides beyond regular working temperatures and cost may either make either of the alternatives more desirable. This chart based on continuous spans and for un-insulated line carrying fluids of specific gravity up to 1.00.

The above table is meant as a general guideline, it is recommended that the pipe manufacturer be consulted for specific spacing recommendations relating to their pipe, load conditions, operating temperature and service conditions.

Local codes and specifications may also vary from the above recommended spacing and should be consulted for the applicable spacing requirements prior to installation.

CPVC Pipe Support Spacing (Continued)

CPVC Pipe Support Spacing

Pipe Size (in.)	Schedule 40 Temperature (°F)						Schedule 80 Temperature (°F)					
	73°	100°	120°	140°	160°	180°	73°	100°	120°	140°	160°	180°
½	5	4½	4½	4	2½	2½	5½	5	4½	4½	3	2½
¾	5	5	4½	4	2½	2½	5½	5½	5	4½	3	2½
1	5½	5½	5	4½	3	2½	6	6	5½	5	3½	3
1¼	5½	5½	5½	5	3	3	6½	6	6	5½	3½	3
1½	6	6	5½	5	3½	3	7	6½	6	5½	3½	3½
2	6	6	5½	5	3½	3	7	7	6½	6	4	3½
2½	7	7	6½	6	4	3½	8	7½	7½	6½	4½	4
3	7	7	7	6	4	3½	8	8	7½	7	4½	4
3½	7½	7½	7	6½	4	4	8½	8½	8	7½	5	4½
4	7½	7½	7	6½	4½	4	8½	9	8½	7½	5	4½
6	8½	8	7½	7	5	4½	10	9½	9	8	5½	5
8	9½	9	8½	7½	5½	5	11	10½	10	9	6	5½
10	10½	10	9½	8	6	5½	11½	11	10½	9½	6½	6
12	11½	10½	10	8½	6½	6	12½	12	11½	10½	7½	6½
14	12	11	10	9	8	6	15	13½	12½	11	9½	8
½	13	12	11	9½	8½	7	16	15	13½	12	10	8½

Note: Although support spacing is shown at 140°F, consideration should be given to the use of CPVC or continuous support above 120°F.

The possibility of temperature overrides beyond regular working temperatures and cost may either make either of the alternatives more desirable. This chart based on continuous spans and for un-insulated line carrying fluids of specific gravity up to 1.00.

The above table is meant as a general guideline, it is recommended that the pipe manufacturer be consulted for specific spacing recommendations relating to their pipe, load conditions, operating temperature and service conditions.

Local codes and specifications may also vary from the above recommended spacing and should be consulted for the applicable spacing requirements prior to installation.

Pipe Hangers — Copper Tubing Hangers • Stainless Steel Hangers • CPVC Pipe Hangers • Pipe Rings

Copper Tubing Hangers

Fig. CT-69
Adjustable Swivel Ring
Size Range: ½" thru 4"

Fig. CT-65
Light Duty Adjustable Clevis
Size Range: ½" thru 4"

Fig. CT-138R
Extension Split Tubing Clamp
Size Range: ½" thru 2"

Fig. 69F
Adjustable Swivel Ring Felt Lined
Size Range: ½" thru 6"

Fig. 67F
Copper Tube Felt Lined Hanger
Size Range: ½" thru 6"

Fig. CT-255
Copper Tubing Alignment Guide
Size Range: 1" thru 4"

Fig. CT-121
Copper Tubing Riser Clamp
Size Range: ½" thru 4"

Fig. CT-128R
Rod Threaded Ceiling Flange
Size Range: ⅜" thru ½"

Stainless Steel Hangers

Fig. 137SS
Standard U-Bolt
Size Range: 1" thru 12"

Fig. 260SS
Adjustable Clevis Hanger
Size Range: ½" thru 12"

Fig. 261SS
Extension Pipe or Riser Clamp
Size Range: ½" thru 8"

Fig. 590SS
Adjustable Clevis for Ductile or C.I. Pipe
Size Range: 4" thru 12"

CPVC Pipe Hangers

Fig. 185
One Hole Pipe Strap
Size Range: ¾" thru 2"

Fig. 186
Two Hole Pipe Strap
Size Range: ¾" thru 2"

Fig. 187
Two Hole 90° Side Mount Strap
Size Range: ¾" thru 2"

Fig. 188
Two Hole Stand Off Strap
Size Range: ¾" thru 2"

Pipe Rings

Fig. 108
Split Pipe Ring
Size Range: ⅜" thru 8"

Fig. 138R
Extension Split Pipe Clamp
Size Range: ⅜" thru 3"

Fig. 104
Adjustable Swivel Ring, Split Ring Type
Size Range: ¾" thru 8"

Fig. 69
Adjustable Swivel Ring
Size Range: ½" thru 8"

ASC Engineered Solutions

Pipe Hangers — Hanger Rods & Attachments • Straps

Hanger Rods & Attachments

Fig. 142
Coach Screw Rods Machine Threaded on Opposite End
Size Range: ⅜" thru 1½"

Fig. 146
Continuous Thread
Size Range: ¼" thru 1½"

Fig. 140 & 253
Machine Threaded Rods Threaded on Both Ends
Size Range: ⅜" thru 5"

Fig. 248
Eye Rod Not Welded
Size Range: ⅜" thru 2½"

Fig. 278
Eye Rod Welded
Size Range: ⅜" thru 2½"

Fig. 248X
Linked Eye Rods
Size Range: ⅜" thru 2½"

Fig. 278X
Linked Eye Rods Welded
Size Range: ⅜" thru 2½"

Fig. 148
Rod with Eye End
Size Range: 2¾" thru 5"

Fig. 135 & 135E
Straight Rod Coupling
Size Range: ¼" thru 1"

Fig. 136: Fig. 136R:

Fig. 136 & 136R
Straight Rod Coupling
Size Range: ¼" thru 1"

Fig. 114
Turnbuckle Adjuster
Size Range: ¼" thru ¾"

Fig. 110R
Socket, Rod Threaded
Size Range: ¼" thru ⅞"

Fig. 157
Extension Piece
Size Range: ⅜" thru ⅞"

Fig. 290
Weldless Eye Nut
Size Range: ⅜" thru 2½"

Fig. 299
Forged Steel Clevis
Size Range: ⅜" thru 4"

Fig. 230
Turnbuckle
Size Range: ⅜" thru 2½"

Fig. 233
Turnbuckle
Size Range: 1¼" thru 5"

Fig. 291
Clevis Pin with Cotters
Size Range: ½" thru 4"

Machine Bolts and Hex Nuts

Straps

Fig. 262
Strap Short
Size Range: ½" thru 4"

Fig. 126
One-Hole Clamp
Size Range: ⅜" thru 4"

Fig. 243
Pipe Strap
Size Range: ½" thru 6" pipe

Fig. 244
Pipe Strap
Size Range: ½" thru 6" pipe

Pipe Hangers — Concrete Inserts & Attachments • Pipe Supports • Ceiling Plates

Concrete Inserts & Attachments

Fig. 152
Screw Concrete Insert
Size Range: 3/8" thru 7/8"

Fig. 282
Universal Concrete Insert
Size Range: 3/8" thru 7/8"

Fig. 281
Wedge Type Conrete Insert
Size Range: 1/4" thru 7/8"

Fig. 285
Light Weight Concrete Insert
Size Range: 1/4" thru 5/8"

Fig. 286
Iron Cross
Size Range: 3/4" thru 1 1/2"

Fig. 284
Metal Deck Hanger
Size Range: 3/8" thru 3/4"

Fig. 47
Concrete Single Lug Plate
Size Range: 1/2" thru 2"

Fig. 49
Concrete Clevis Plate
Size Range: 3/8" thru 1 3/4"

Fig. 52
Concrete Rod Attachment Plate
Size Range: 3/8" thru 1 1/4"

Pipe Supports

Fig. 62
Type A, B, and C Pipe Stanchion
Size Range: 2" thru 18"

Fig. 63
Type A, B, and C Pipe Stanchion
Size Range: 2 1/2" thru 42"

Fig. 192
Adjustable Pipe Saddle
Size Range: 2" thru 12"

Fig. 191
Adjustable Pipe Saddle with U-Bolt
Size Range: 2" thru 12"

Fig. 258
Pipe Stanchion Saddle
Size Range: 4" thru 36"

Fig. 264
Adjustable Pipe Saddle Support
Size Range: 2 1/2" thru 36"

Fig. 265
Adjustable Pipe Saddle Support with U-Bolt
Size Range: 4" thru 36"

Fig. 259
Pipe Saddle Support with U-Bolt
Size Range: 4" thru 36"

Ceiling Plates

Fig. 127
Plastic Ceiling Plate
Size Range: 3/8" and 1/2"

Fig. 395
Cast Iron Ceiling Plate
Size Range: 1/2" thru 8"

Fig. 128R
Rod Threaded, Ceiling Flange
Size Range: 3/8" and 1/2"

Fig. 153
Pipe Hanger Flange
Size Range: 3/8" thru 3/4"

ASC Engineered Solutions

Pipe Hangers — Clevis • Steel Pipe Clamps • Brackets • Beam Clamps • Structural Attachments • U-Bolts

Clevis

Fig. 67
Pipe or Conduit Hanger
Size Range:
½" thru 6"

Fig. 65
Light Duty Adjustable Clevis
Size Range:
⅜" thru 4"

Fig. 260
Adjustable Clevis Hanger
Size Range:
½" thru 30"

Fig. 260 ISS
Clevis Hanger with Insulation Saddle System
Size Range:
2" thru 16"

Fig. 300
Adjustable Clevis for Insulated Lines
Size Range:
¾" thru 12"

Fig. 590
Adjustable Clevis for Ductile or Cast Iron
Size Range:
3" thru 24"

Steel Pipe Clamps

Fig. 261
Extension Pipe or Riser Clamp
Size Range:
¾" thru 24"

Fig. 40
Riser Clamp Standard
Size Range:
2" thru 24"

Fig. 103
Offset Pipe Clamp
Size Range:
¾" thru 8"

Fig. 100
Extended Pipe Clamp
Size Range:
½" thru 8"

Fig. 212
Medium Pipe Clamp
Size Range:
½" thru 30"

Fig. 212FP
Earthquake Bracing Clamp
Size Range:
2½" thru 12"

Fig. 216
Heavy Pipe Clamp
Size Range:
3" thru 42"

Fig. 295
Double Bolt Pipe Clamp
Size Range:
¾" thru 36"

Fig. 295A
Alloy Double Bolt Pipe Clamp
Size Range:
1½" thru 24"

Fig. 295H
Heavy Duty Double Bolt Pipe Clamp
Size Range:
6" thru 36"

Fig. 224
Alloy Steel Pipe Clamp
Size Range:
4" thru 16"

Fig. 246
Heavy Duty Alloy Steel Pipe Clamp
Size Range:
10" thru 24"

Brackets

Fig. 202
Iron Side Beam Bracket
Size Range:
⅜" thru ⅝"

Fig. 206
Steel Side Beam Bracket
Size Range:
⅜" thru ⅝"

Fig. 207
Threaded Steel Side Beam Bracket
Size Range:
⅜" and ½"

Fig. 194
Light Welded Steel Bracket

Fig. 195
Medium Welded Steel Bracket

Fig. 199
Heavy Welded Steel Bracket

Pipe Hangers — Beam Clamps • Structual Attachments • U-Bolts

Beam Clamps

Fig. 86 & 88
C-Clamp with Set Screw and Lock Nut
Size Range:
3/8" thru 3/4"

Fig. 95
C-Clamp with Locknut
Size Range:
3/8" and 3/4"

Fig. 89
Size Range:
3/8" thru 1/2"

Fig. 89X
Retaining Clip
Size Range:
3/8" thru 3/4"

Fig. 92
Universal C-Type Clamp Standard Throat
Size Range:
3/8" and 1/2"

Fig. 93
Universal C-Type Clamp Wide Throat
Size Range:
3/8" and 1/2"

Fig. 94
Wide Throat Top Beam C-Clamp
Size Range:
3/8" and 3/4"

Fig. 227
Top Beam Clamp

Fig. 14
Adjustable Side Beam Clamp
Size Range:
3/8" thru 5/8"

Fig. 217
Adjustable Side Beam Clamp
Size Range:
3" thru 7 5/8"

Fig. 133
Standard Duty Beam Clamp
Size Range:
4" thru 12"

Fig. 134
Heavy Duty Beam Clamp
Size Range:
4" thru 12"

Fig. 218
Malleable Beam Clamp without Extension Piece

Fig. 228
Universal Forged Steel Beam Clamp

Fig. 292 & 292L
Universal Forged Steel Beam Clamp with Weldless Eye Nut

Structural Attachments

Fig. 55 & 55L
Structural Welding Lug
Size Range (55):
1/2" thru 3 3/4"
Size Range (55L):
1/2" thru 2"

Fig. 54
Two-Hole Welding Beam Lug
Size Range:
1/2" thru 2 1/4"

Fig. 66
Welding Beam Attachment
Size Range:
3/8" thru 3 1/2"

Fig. 60
Steel Washer Plate
Size Range:
3/8" thru 3 3/4"

Fig. 112 & 113
Size Range:
1" and 1 1/4"

U-Bolts

Fig. 137 & 137S
Standard U-Bolts
Size Range: 1/2" thru 36"

Fig. 137C
Plastic Coated U-Bolts
Size Range: 1/2" thru 8"

Fig. 120
Light Weight U-Bolt
Size Range: 1/2" thru 10"

ASC Engineered Solutions

Pipe Hangers — Pipe Rolls • Pipe Guides & Slides • Pipe Shields & Saddles

Pipe Rolls

Fig. 177
Adjustable Pipe Roll Support
Size Range: 1" thru 30"

Fig. 171
Single Pipe Roll
Size Range: 1" thru 30"

Fig. 178
Spring Cushion Hanger

Fig. 181
Adjustable Steel Yoke Pipe Roll
Size Range: 2½" thru 24"

Fig. 175
Roller Chair
Size Range: 2" thru 30" pipe

Fig. 277
Pipe Roll and Base Plate
Size Range: 2" thru 24"

Fig. 271
Pipe Roll Stand
Size Range: 2" thru 42"

Fig. 274, 274P & 275
Adjustable Pipe Roll Stand
Size Range: 2" thru 42"

Fig. 75LL
Longitudinal & Lateral Roller

Fig. 76CP
Non-Conductive Roller

Pipe Guides & Slides

Fig. 255
Pipe Alignment Guide
Size Range: 1" thru 24" pipe and insulation thickness of 1" thru 4"

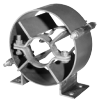


Fig. 256
Pipe Alignment Guide
Size Range: 1" thru 24" pipe and insulation thickness of 1" thru 4"

Fig. 257 & 257A
Structural Tee Slide Assembly
Size Range: All sizes within maximum load rating

Fig. 436 & 436A
Fabricated Tee Slide Assembly
Size Range: All sizes within maximum load rating

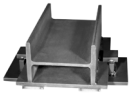


Fig. 439 & 439A
Structural "H" Slide Assembly, Complete
Size Range: 6" thru 36"

Fig. 432
Special Clamp
Size Range: 2" thru 24"

Fig. 212
Medium Pipe Clamp
Size Range: 2" thru 30"

Pipe Shields & Saddles

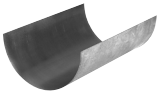


Fig. 167
Insulation Protection Shield
Size Range: ½" thru 24" pipe with up to 2" thick insulation

Fig. 168
Rib-Lok Shield
Size Range: ½" thru 8" pipe or copper tube with up to 2" thick insulation

Fig. 160 to 166A
Pipe Covering Protection Saddle
Size Range: ¾" thru 36"

ASC Engineered Solutions

Pipe Hangers — **Trapeze • Socket Clamps**

Trapeze

Fig. 46
Universal Trapeze Assembly

Fig. 45
Channel Assembly

Fig. 50
Equal Leg Angle for Trapeze Assembly

Socket Clamps

Fig. 595 & 594
Socket Clamp for Ductile Iron or Cast Iron Pipe & Socket Clamp Washer
Size Range: 4" thru 24" pipe

Fig. 600 & 599
Socket Clamp for Ductile Iron or Cast Iron Pipe & Socket Clamp Washer
Size Range: 3" thru 24" pipe

Sway Brace – Seismic Pictorial
Pipe Brace Clamps • Structural Attachments • Sway Brace Attachment • Restraints

Pipe Brace Clamps

Fig. 770
Q Brace Clamp
Size Range:
1" thru 6"
Service Pipe

Fig. 776
Brace Clamp
Size Range:
2½" thru 8"
Service Pipe

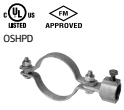


Fig. 775
Lateral / Longitudinal Brace Clamp
Size Range:
2½" thru 8"
Service Pipe

Restraints

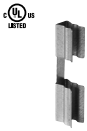


Fig. 773
Surge Restrainer
Size Range:
¾" thru 2"
Swivel Ring Hanger

Fig. 777
Swivel Joint Connector–Rod Tap
Size: ⅜" Rod Diameter

Structural Attachments

Fig. 778
Bar Joist and Beam Attachment (WF)
Size Range: Flange Thickness ⅛" thru ¾"

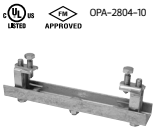


Fig. 772
Adjustable Steel Beam Attachment
Size Range:
Flange Widths 4" thru 15"

Fig. 779
Multi–Connector Adapter
Size Range:
1" thru 8" Service Pipe

Sway Brace Attachment

Fig. 771
Sway Brace Swivel Attachment
Size Range:
1" and 1¼" Brace Pipe

Notes:
1. For fire protection installations – sway braces are intended to be installed in accordance with NFPA–13 and ASC's installations instructions and local codes.
2. The required type, number and size of fasteners used for the structural attachment fitting shall be in accordance with NFPA–13.

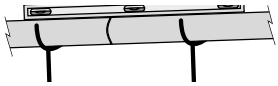
Alignment of Pipe

Proper alignment is important if a piping system is to be correctly fabricated. Poor alignment may result in welding difficulties and a system that does not function properly.

Welding rings may be employed to assure proper alignment as well as the correct welding gap. In addition to using welding rings, some simple procedures can be followed to assist the pipe fitter. Below and on the following page are alignment procedures commonly used by today's craftsmen.

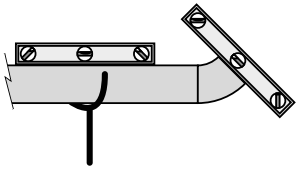
Pipe-to-Pipe

1. Level one length of pipe using spirit level.
2. Bring lengths together leaving only small welding gap.
3. Place spirit level over both pipes as shown and maneuver unpositioned length until both are level.
4. Tack weld top and bottom.
5. Rotate pipe 90°.
6. Repeat procedure.



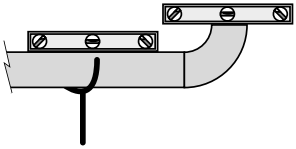
45° Elbow-to-Pipe

1. Level pipe using spirit level.
2. Place fitting to pipe leaving small welding gap.
3. Place 45° spirit level on face of elbow and maneuver elbow until bubble is centered.
4. Tack weld in place.



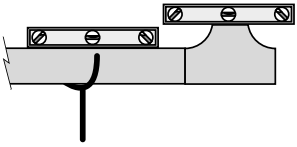
90° Elbow-to-Pipe

1. Level pipe using spirit level.
2. Place fitting to pipe leaving small welding gap.
3. Place spirit level on face of elbow and maneuver elbow until level.
4. Tack weld in place.



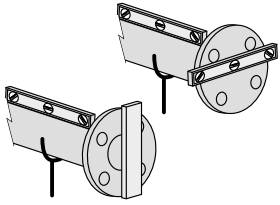
Tee-to-Pipe

1. Level pipe using spirit level.
2. Place tee to pipe leaving small welding gap.
3. Place spirit level on face of tee and maneuver tee until level.
4. Tack weld in place.



Alignment of Pipe (Continued)

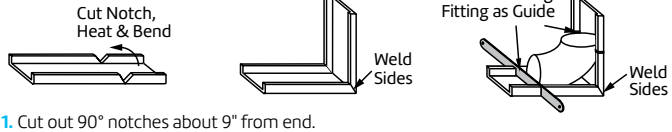
Flange-to-Pipe



1. Bring flange to pipe end leaving small welding gap.
2. Align top two holes of flange with spirit level.
3. Tack weld in place.
4. Center square on face of flange as shown.
5. Tack weld in place.
6. Check sides in same way.

Jig for Small Diameter Piping

The jig is made from channel iron 3' 9" long. Use ⅛" x 1½" for pipe sizes 1¼" thru 3"; ⅛" x ¾" for sizes 1" or smaller.



1. Cut out 90° notches about 9" from end.
2. Heat bottom of notch with torch.
3. Bend channel iron to 90° angle and weld sides.
4. Place elbow in jig and saw half thru sides of channel iron as shown. Repeat this step with several elbows so jig may be used for different operations.
5. A used hack saw blade placed in notch as shown will provide proper welding gap.

Tap & Drill Sizes & Drill Sizes for NPT Pipe Taps

Tap and Drill Sizes*

Tap Size	Threads/In.	Drill Size
¼	20	7
5/16	18	F
⅜	16	5/16
7/16	14	U
½	13	72/64
9/16	12	31/64
⅝	11	17/32
¾	10	21/32
⅞	9	49/64
1	8	⅞
1⅛	7	63/64
1¼	7	1 7/64
1⅜	6	1 17/32
1½	6	1 11/32
1¾	5	1 9/16
2	4½	25/32

*Unified National Coarse

Drill Sizes for NPT Pipe Taps

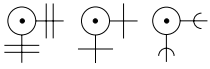
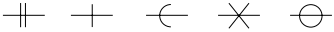
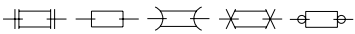
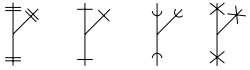
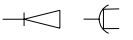
Tap Size	Threads/In.	Drill Dia.
⅛	27	R
¼	18	7/16
⅜	18	37/64
½	14	23/32
¾	14	59/64
1	11½	1 5/32
1¼	11½	1½
1½	11½	1 47/64
2	11½	2 7/32
2½	8	2⅝
3	8	3¼
3½	8	3¾
4	8	4¼

ASC Engineered Solutions

Symbols for Pipe Fittings

	Flanged	Screwed	Bell & Spigot	Welded	Soldered
Bushing (Reducing)					
Cap					
Cross (Reducing)					
Cross (Straight)					
Crossover					
Elbow – 45˚					
Elbow – 90˚					
Elbow – Turned Down					
Elbow – Turned Up					
Elbow – Base					
Elbow – Double Branch					
Elbow – Long Radius					
Elbow – Reducing					

Symbols for Pipe Fittings (Continued)

	Flanged	Screwed	Bell & Spigot	Welded	Soldered
Elbow – Side Outlet (Outlet Down)					
Elbow – Side Outlet (OutletUp)					
Elbow – Street					
Joint – Connecting Pipe					
Joint – Expansion					
Lateral					
Orifice Plate					
Reducing Flange					
Plug – Bull					
Plug – Pipe					
Reducer – Concentric					
Reducer – Eccentric					
Valve – Gate Angle Gate (Plan)					

Symbols for Pipe Fittings (Continued)

	Flanged	Screwed	Bell & Spigot	Welded	Soldered
Valve – Globe Angle Globe (Elevation)					
Valve – Globe (Plan)					
Valve (Auto) – By–Pass					
Valve (Auto) – Governor Operated					
Valve – Reducing					
Valve – Check (Straight Way)					
Valve – Cock					
Valve – Diaphragm					
Valve – Float					
Valve – Gate*					
Valve – Gate Motor Operated					
Valve – Globe					
Valve – Globe Motor Operated					

*Also used for General Stop Valve when amplified by specification.

Symbols for Pipe Fittings (Continued)

	Flanged	Screwed	Bell & Spigot	Welded	Soldered
Valve – Angle Hose Angle					
Valve – Hose Gate					
Valve – Hose Globe					
Valve – Lockshield					
Valve – Quick Opening					
Valve – Saftey					
Sleeve					
Tee – Straight					
Tee – Outlet Up					
Tee – Outlet Down					
Tee – Double Sweep					
Tee – Reducing					
Tee – Single Sweep					

Symbols for Pipe Fittings (Continued)

	Flanged	Screwed	Bell & Spigot	Welded	Soldered
Tee – Side Outlet (Outlet Down)					
Tee – Side Outlet (Outlet Up)					
Union					
Angle Valve Check					
Angle Valve Gate					

Glossary of Terms and Abbreviations

AGA..... American Gas Association
ANSI..... American National Standards Institute
API..... American Petroleum Institute
ASME..... American Society of Mechanical Engineers
ASPE..... American Society of Plumbing Engineers
ASHRAE..... American Society of Heating, Refrigeration, Air Conditioning Engineers
ASTM..... American Society for Testing Material
AWWA..... American Water Works Association
Adaptor — A fitting that joins two different type of pipe together such as PVC to cast iron, or threaded to non-threaded.
Alloy..... A substance composed of two or more metals or a metal and compound.
American Standard Pipe Thread..... A type of screw thread commonly used on pipe and fittings.
Annealing..... A softening treatment consisting of heating carbon or alloy steel or cast iron to an appropriate temperature, holding the temperature for a proper period of time and slowly cooling to ambient temperature.
BOCA..... Building Officials Conference of America
Bell Reducer..... Another term for a concentric reducer.
Bar Plug..... Iron plugs in the 4" thru 8" size that have slotted rather than square heads. Made on to a fitting by use of a steel bar as opposed to a wrench.
Backflow Preventer..... A device of means to prevent backflow (siphonage) into a portable water system.
Black Pipe..... Non-galvanized steel pipe with a lacquer finish.
Blind Flange..... A flange used to seal off the end of a pipe.
Branch..... Any part of the piping system other than a main, riser or stack.
Bubble Tight..... The condition of a valve seat that prohibits the leakage of visible bubbles when closed.
Bull Head Tee..... The outlet of the tee is larger than the run.
Bushing..... A pipe fitting for connecting a pipe with a female or larger size fitting: it has a hollow plug with male and female threads.
Butt Nipple..... A nipple with NPT threads and a shorter overall length than a close nipple used when there is a space consideration. A special order item.
Butt Weld..... A circumferential weld in pipe fusing the abutting pipe walls completely from inside wall to outside wall.
CI..... Cast Iron

Glossary of Terms and Abbreviations (Continued)

Carbon Steel Pipe.....Steel pipe that owes its properties mostly to the carbon it contains.

Cavitation.....A localized gaseous condition that is found within a liquid stream.

Chamfer.....A bevel cut on the O.D. of a pipe nipple at 35 degrees (plus/minus 10 degrees) to axis. In a standard nipple both ends are chamfered.

Chase.....A recess in a wall in which pipes can be run.

Close Nipple.....A nipple with a length twice the length of a standard pipe thread.

Companion Flange.....A flange with a sealing surface on one side for connecting to a flanged fitting or flanged valve and a pipe thread entrance on the other side.

Continuous Weld Pipe (CW).....A process for making smaller diameter pipe through 4½" where the entire continuous ribbon of steel is heated in a furnace to the required temperature for forming and fusing. The edges of steel are firmly pressed together by rolls to obtain a forged weld. Heat and pressure form the weld.

Countersunk Plug.....A low pattern plug lacking a protruding head rather with a recess or socket, usually in square or hexagon pattern.

Coupling.....A pipe fitting with female threads used to connect two pipes in a straight line.

Cross.....A pipe fitting with four branches in pairs, each pair on one axis, and the axis at right angles.

Cross-Connection.....Any connection or situation that may allow wastewater to enter the water supply system.

Cut Lengths.....Pipe cut to a specific length as ordered.

DWV.....Drainage, waste and vent system.

Dielectric Fitting.....A fitting having insulating parts or material that prohibits flow of electric current.

Die.....Cutting device used to thread pipe. A set of these attach to dieheads and is mounted on a threader.

Dope.....Pasty lubricant used to seal pipe threads prior to making a threaded pipe connection.

Drop Ear Elbow.....A small elbow having wings cast on each side; the wings have countersunk holes to secure to a ceiling or wall.

Dry-Pipe Valve.....A valve used with a dry-pipe sprinkler system where water is on one side of the valve and air is on the other side. When the link in the sprinkler head melts releasing air from the system the valve opens allowing water to flow.

Durham System.....A term used to describe soil or waste systems where all piping is threaded.

Glossary of Terms and Abbreviations (Continued)

Eccentric Fitt..... Fittings whose openings are offset allowing liquid to flow freely.

Elbow..... A fitting that makes a 90 degree angle between adjacent pipes unless another angle is specified.

Electrogalvanizing..... A process on bonding a layer of zinc to steel or iron involving electroplating by running a current through a saline/zinc solution with a zinc anode and a steel or iron conductor.

Electric Resistance Weld Pipe (ERW)..... Cold finished pipe made by flat steel is cold shaped into tubular form and then welded at the seam from heat generated by resistance to the flow of electric current applied through electrical contacts.

End Connection..... The method of connecting the parts of a piping system.

Extra Heavy..... Description of piping material indicating thicker than standard.

FIP..... Female iron pipe connection. Standard internal threads on pipe fittings.

Face to Face Dimension..... The dimensions from the face of the inlet port to the face of the outlet port of a fitting or valve.

Face Bushing..... A bushing without the hex head. A low pattern bushing used when a smooth transition is required between fitting and nipple when insulating. Also used for reducing with 300# fittings as recommended by ASME B16.14.

Female Thread..... The internal thread in pipe fittings, valves, etc.

Fitting, Compression..... A fitting designed to join pipe or tubing by means of pressure or friction.

Flange Fitting..... A fitting which utilizes a radically extended collar for sealing and connection.

Flange..... A ring-shaped plate at the end of a pipe, at right angles to the pipe, provided with holes for bolts to allow fastening the pipe to similarly equipped adjoining pipe.

Floor Flange..... A construction flange with no pressure rating. Used to secure structural components, e.g. hand rails, to floors or walls.

FM..... Factory Mutual Engineering Corp.

Forged Steel Fittings..... Solid pieces of steel are forced into fitting shapes under very high temperature and pressure and then machined into final form.

Friction Loss..... The loss of pressure caused by the turbulence created in water while traveling through pipe, fittings and valves.

GAL..... Gallons

GALV..... Galvanized

GPM..... Gallons per minute

Glossary of Terms and Abbreviations (Continued)

Galvanic Action ..... When two dissimilar metals are immersed in the same electrolytic solution and connected electrically there is an interchange of atoms carrying an electric charge between them. The anode metal with the higher electrode potential corrodes with the cathode protected.

Galvanized Pipe ..... Steel pipe coated with zinc to resist corrosion.

Galvanizing ..... A process where the surface of iron or steel piping or fittings is covered with a layer of zinc.

Gasket ..... A flat device usually made of fiber or rubber used to provide a watertight seal between metal joints.

Groove – Cut ..... A circumferential groove that has been cut into a segment of pipe. Metal is removed in this process. For use in a grooved-end piping system.

Groove – Roll ..... A circumferential groove that has been forced or swagged into a pipe segment. The metal is displaced inside the pipe. No metal is removed in the process. For use in a grooved-end piping system.

Ground Joint ..... Where the parts to be joined are precisely finished and then ground so that the seal is tight.

Ground Joint Union ..... A pipe union that has a brass or copper grounding section between the two.

HVAC ..... Heating, ventilation and air conditioning

Half Coupling ..... A full steel coupling sawed in half. Uses as drain or valve access ports in steel tanks. Not recognized by industry specification.

Header ..... A large pipe from which a number of smaller ones are connected in line from the side of the large pipe.

Hot Dip Galvanizing ..... The process of coating iron or steel with a layer of zinc by passing the metal through a molten batch of zinc at a temperature of 450 deg F.

IAPMO ..... International Association of Plumbing & Mechanical Officials

ISO 9000 ..... A series of five standards for developing a total quality management system. Developed by the International Organization for Standardization.

ID ..... Inside diameter

IPS ..... Iron pipe size. Same as NPS.

Lateral Fitting ..... A wye (Y) fitting with an outlet at a 45 degree angle from the run.

LEED ..... Leadership in Energy and Environmental Design

Listed ..... Equipment or materials included in a list published by an organization that maintains periodic inspection on current production. The listing states that the equipment or material complies with approved standards or has been tested and found suitable for use in a specified manner.

Glossary of Terms and Abbreviations (Continued)

Listing Agency — An agency accepted by the administrative authority which lists and maintains a periodic inspection program on current production.

Locknut — A malleable nut having a packing recess for seals for use in tank applications.

MI — Malleable iron

MIP — Male iron pipe connection. Standard external threads on pipes and fittings. Same as MPT.

MPT — Male pipe thread where the threads are on the outside of pipes and fittings.

Malleable Iron — Cast iron that is heat-treated to reduce brittleness allowing the material to stretch slightly.

Manifold — A fitting with a number of branches in line connecting to smaller pipes. Term is interchangeable with "Header."

Mill Length — Also known as random length; run of mill pipe 16 to 20 feet in length. Some pipe is made in double lengths of 30 to 35 feet.

NPS — Nominal pipe size. Same as IPS.

NPT — Nominal Pipe Taper (American Standard Pipe Taper Thread)

NPSC — Nominal Pipe Straight Coupling (American Standard Straight Coupling Thread)

NSF — NSF International (formerly National Sanitation Foundation)

Natural Gas — A colorless, odorless fuel derived from the earth consisting primarily of Methane (CH4). Mercaptans (odors) are added to aid in leak detection.

Nipple — Nipples are used to connect fittings, extend lines and provide proper threading distances at the right locations. Normally, a nipple is 12" and under in length with a male thread at both ends.

Normalizing — A heat treatment applied to steel involving heating above the critical range followed by cooling in still air. Performed to refine the crystal structure and eliminate internal stress.

OD — Outside Diameter. The diameter of a pipe measured from the outside edges.

O.D. Pipe — Pipe that measures over 14" N.P.S. where the nominal size is the outside diameter and not the inside diameter.

OEM — Original Equipment Manufacturer

Offset — A combination of pipe and / or fittings that joins two nearly parallel sections of a pipe line.

PSI — Pounds per square inch

PSIG — Pounds per square inch guage

Pickling — Pipe immersed into an acid bath for removal of scale, oil, dirt, etc.

Glossary of Terms and Abbreviations (Continued)

Plug..... Has a male thread and is used to close an opening. Can be made from iron or steel. Cored plugs are for standard applications while solid are for extra heavy applications. The head is typically square pattern. Recessed or countersunk plugs are in square or hexagonal pattern.

Ready Cut Pipe..... Pipe normally threaded both ends in lengths longer than 12" but shorter than 21'. Also referred to as cut pipe.

Reducer..... A pipe fitting with inside threads that is larger at one end than the other.

Right Hand/Left Hand Nipples (couplings)..... A nipple with a right hand thread on one side and a left hand thread on the other side. To be used with RH/LH couplings Takes the place of a union in tight areas to permit line connections and disconnections.

Riser..... A water supply pipe that extends vertically one full story or more to carry water to branches.

SMLS..... Seamless pipe

SPEC..... Specification

STD..... Standard

Saturated Steam..... Steam at the same temperature as water boils under the same pressure.

Schedule..... Numbers assigned to different wall thicknesses of pipe (e.g. 40, 80, 160).

Screwed Joint..... A pipe joint consisting of threaded male and female parts threaded together.

Seamless Pipe..... Pipe or tube formed by piercing a billet of steel and then rolling.

Service Tee..... Tee fitting with male threads on one run opening and female threads on the other run opening and outlet.

Service Pipe..... A pipe connecting water or gas mains with a building.

Short Nipple..... A nipple whose length is a little greater than that of two threaded lengths or somewhat longer than a close nipple so that it has some unthreaded portion between the two threads.

Shoulder Nipple..... A nipple halfway between the length of a close nipple and a short nipple.

Socket Weld..... A joint made by use of a socket weld fitting which has a prepared female end or socket for insertion of the pipe to which it is welded.

Sprinkler System..... An integrated system of underground and overhead piping designed in accordance with fire protection engineering standards.

Stainless Steel Pipe..... An alloy steel pipe with corrosion-resisting properties, usually imparted by nickle and chromium.

Glossary of Terms and Abbreviations (Continued)

Straight Thread ..... A parallel thread that lacks taper.

Street Elbow..... An elbow with male thread on one end and female thread on the other.

Superheated Steam..... Steam at a higher temperature than that at which water would boil under the same pressure.

Tank Nipple..... Nipples are in 6" lengths only. One side has a standard NPT thread while the other has a straight running NPSL thread. Can be used as tank legs or as a threaded port in the side of a steel tank secured with a lock nut.

Tapered Threads ..... Male and female threads designed with a 60 degree angle, deeper at the end of the pipe or fitting and increasingly shallower the further they are from the end of the pipe or fitting.

Tee..... A fitting that has one side outlet at right angles to the run.

Thermal Movement of Pipe..... The calculated movement, expansion or contraction, in a pipe run or segment there of caused by heating or cooling of the pipe.

UL..... Underwriter's Laboratories, Inc.

Union..... Basically, two couplings held together with a nut that permit connections and disconnections with little disturbance to pipe sections. Unions commonly have a brass or copper seat ring between the couplings.

Union – All Iron ..... A union without a copper, copper alloy or brass seat ring. Used in piping applications where alkalis or acids are present.

Union Ell..... An ell with a male or female union at one end.

Union Tee..... A tee with a male or female union at one end of the run.

Wall Thickness ..... The thickness of the tubing or pipe wall.

Waste Nut..... A malleable nut with two screw holes on either side of the pipe opening. Used for mounting to equipment panels.

Water Hammer..... The noise and vibration which develops in a piping system when a column of non-compressable liquid flowing through a pipe line at a given pressure and velocity is abruptly stopped.

W.O.G. ..... Water, oil, gas: refers to the pressure rating of a fitting in ambient temperature.

WSP)..... Working steam pressure: Refers to the pressure rating of a fitting at saturated steam temperature.

Wye (Y)..... A fitting that has one side outlet at an angle other than 90 degrees.

XH..... Extra Heavy

ASC Engineered Solutions

Notes:

GRUVLOK An ASC Engineered Solution

About ASC Engineered Solutions
ASC Engineered Solutions (formerly Anvil International & Smith-Cooper International) is defined by quality—in its products, services and support. With nearly 2,000 employees, the company's portfolio of precision-engineered piping support, valves and connections provides products to more than 4,000 customers across industries, such as mechanical, industrial, fire protection, oil and gas, and commercial and residential construction. Its portfolio of leading brands includes ABZ Valve®, AFCON®, Anvil®, Anvil EPS, Anvil Services, Basic-PSA, Beck®, Catawissa, Cooplet®, FlexHead®, FPPI®, Gruvlok®, J.B. Smith, Merit®, NAP®, Quadrant®, SCI®, Sharpe®, SlideLOK®, SPF®, SprinkFLEX®, Trenton Pipe, and VEP. With headquarters in Oak Brook, IL, ASC also has ISO 9001:2015 certified production facilities in PA, TN, IL, TX, AL, LA, KS, and RI.

asc-es.com

Building connections that last™

ASC Engineered Solutions