

BRANCH CONNECTIONS



WELDOLET[®]
SOCKOLET[®]
THREDOLET[®]
FLEXOLET[®]
LATROLET[®]
ELBOLET[®]
SWEEPolet[®]
BRAZOLET[®]
COUPOLET[®]



SALES CENTER · WAREHOUSE
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AN ISO 9001 CERTIFIED COMPANY
WWW.BONNEYFORGE.COM | (800) 345-7546

Since 1931 Bonney Forge Olets® have been the benchmark in the branch connection industry...

... because they are forged with durability in mind, scrutinized, and tested to the latest industry standards which results in a superior branch connection.



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GLOBAL REACH

Bonney Forge Europe

Bergamo, Italy



- API 602 Forged Valves
- Pressure Seal Valves
- API 6A Valves
- Floating Ball Valves
- Trunnion Ball Valves
- Double Block & Bleed Valves

bfe.it

Bonney Forge Shanghai

Shanghai, China



- API 594 Valves
- API 600 Valves
- API 623 Valves
- API 6D Valves

bonneyforge.com

WFI International

Houston, TX



- Pipet*
- Bosset*
- Vesselet* (*Insert Weldolet*)
- Nozzelet*
- Flanges
- Swage Nipples
- Stub Ends
- Studding Outlet
- Safe End/Transition Piece
- Seamless Forged Specialty Tees
- Seamless Forged Wyes & Laterals

wfi-intl.com

Bonney Forge

Mt. Union, PA

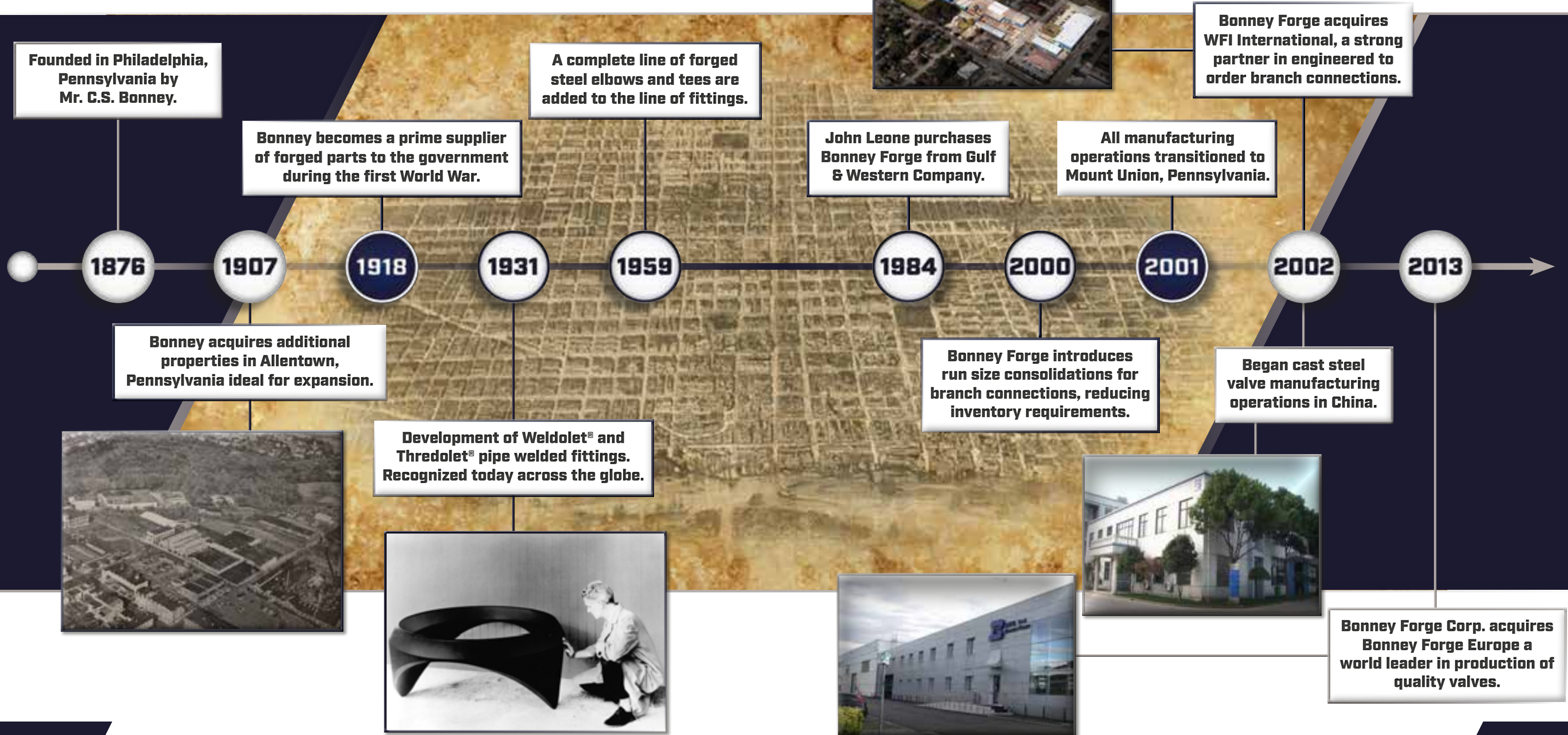


- Forged Elbows/Tees
- Forged Laterals/Crosses
- Forged Street Elbows
- Plugs/Bushings
- Couplings
- Reducer Inserts
- Unions
- Weldolet*
- Sockolet*
- Thredolet*
- Flexolet*
- Latrolet*
- Elbolet*
- Sweepolet*
- Brazolet*
- Couplet*

bonneyforge.com

HISTORY

Since 1931 Bonney Forge has been providing integrally reinforced branch connections to the marketplace. We pride ourselves as being the industry leader for providing code compliant branch connections, so we take care to review, test and evaluate applications that require special attention. Give us a call to see what we can provide for your application.



CONFIGURATIONS

A FULLY REINFORCED HEADER PIPE EVERY TIME

What makes a Bonney Forge Olet® work?

By adding additional material close to the run pipe, Bonney Forge is able to fully reinforce your header pipes. Bonney Forge Olets® coupled with full penetration groove welds meet ASME B31.1 and ASME B31.3 piping codes, the codes your piping systems are designed to.

FULL
PENETRATION
GROOVE
WELD

BRANCH PIPE

HEADER PIPE

TAPER BORE DESIGN

- Wider design reduces stresses in the weld and improves mechanical strength of the connection.
- Tapered bore provides smooth flow transition
- Meets MSS SP-97, ASME B16.11, B31.1 & B31.3 off the shelf. Can be designed to other codes and applications.
- Proof tested to ensure design integrity.



STRAIGHT THRU BORE DESIGN

- Smallest design resulting in less welding and fewer stocking parts to cover the entire range of header sizes.
- Meets MSS SP-97, ASME B16.11 & B31.3 off the shelf. Can be designed to other codes and applications.
- Proof tested to ensure design integrity.



INSERT BRANCH DESIGN

- Wide contour design for lowest stress intensification factors and easiest access for radiography
- Engineered-to-order based on application
- Best for critical applications where flow or acoustic induced vibration (FIV/AIV) are a concern. Well suited for marine, subsea, nuclear, and other critical applications.



PROVEN DESIGN

COMPLETE RANGE OF OLETS® QUALIFIED THROUGH BURST TESTING

How do you know an Olet® will be suitable for your system? Because we tested our fittings to failure. All Bonney Forge branch connections are qualified per MSS SP97 Appendix B requirements by a third party test facility.

Because we test our design to the latest editions of the piping code, we can ensure that Bonney Forge Olets® perform as needed, and as required. The proof is in the testing, Bonney Forge Olets® are the superior branch connection in the industry.

Certificate of Test

Date: March 13, 2014
Project Number: 1752608
PO Number: 116135
Date of Issue: March 12, 2014

April 11, 2013
1752340
2462469C
April 8 - 9, 2013



Resistor to 75% of the burst failure. See attached

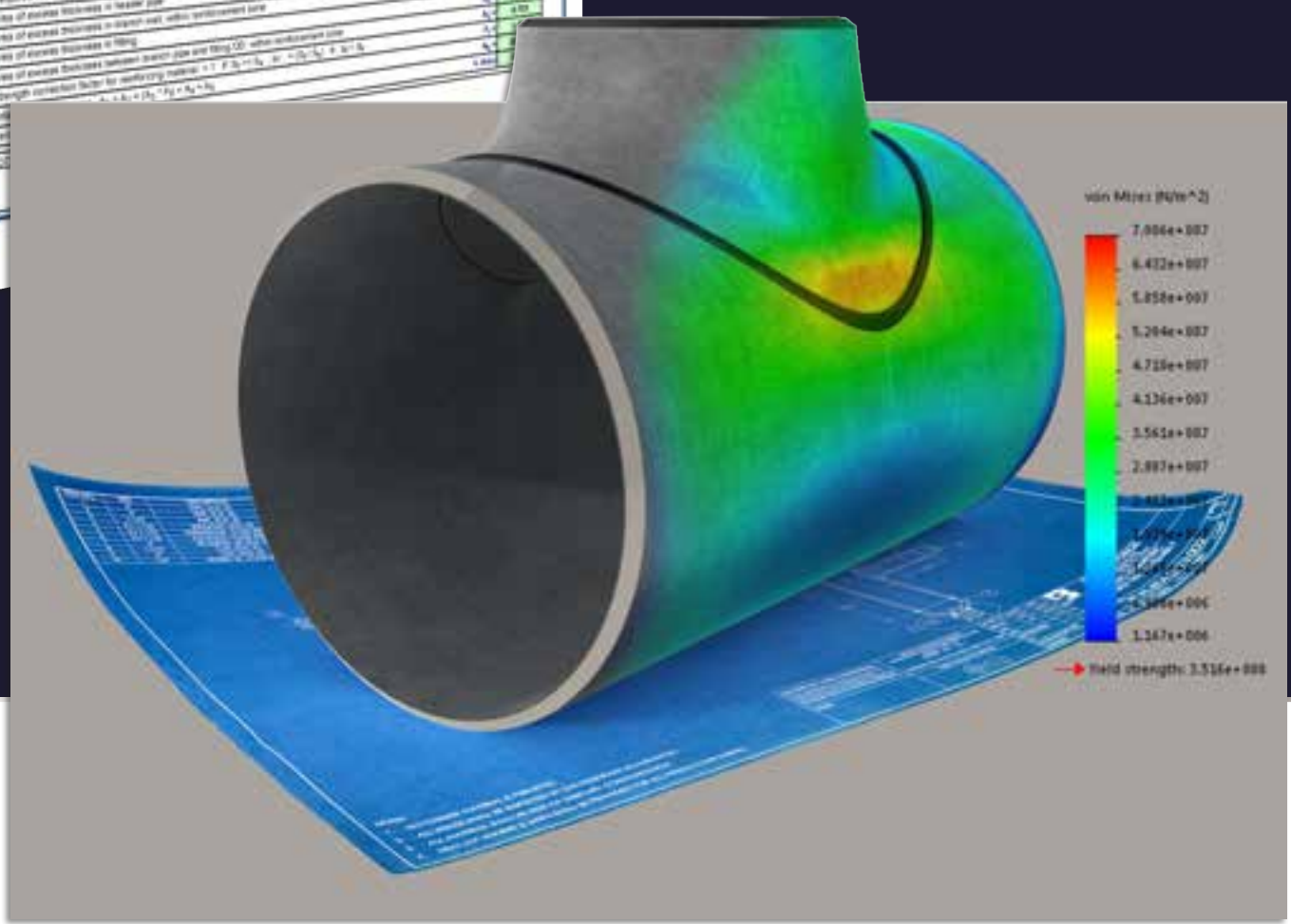
Approved (Name): The use of these...
This report applies only to the...
See Engineering Services...
and is not to be used as a substitute for...
See 3 08172012

SWEEPolet REINFORCEMENT PER ASME B31.3 POWER PIPING CODE			
DESIGNER	DATE	PROJECT	REV
W.H. ENGINEERING	03/13/14	1752608	01
CLIENT	DESCRIPTION	SIZE	STATUS
Global Engineering	SWEEPolet Reinforcement	12" NPS	Final
CUSTOMER No.	MATERIAL	CLASSIFICATION	REMARKS
4078	A105	ASME B31.3 Class 2	

Item	Design Requirement	Actual Value	Pass/Fail
Design Temperature	ASME B31.3 Table 1A.1	ASME B31.3 Table 1A.1	Pass
Header allowable stress at design temp	ASME B31.3 Table 1A.1	ASME B31.3 Table 1A.1	Pass
Branch allowable stress at design temp	ASME B31.3 Table 1A.1	ASME B31.3 Table 1A.1	Pass
Weld joint efficiency	ASME B31.3 Table 1A.1	ASME B31.3 Table 1A.1	Pass
Fitting allowable stress at design temp	ASME B31.3 Table 1A.1	ASME B31.3 Table 1A.1	Pass
Angle between header and branch	ASME B31.3 Table 1A.1	ASME B31.3 Table 1A.1	Pass
Internal design pressure	ASME B31.3 Table 1A.1	ASME B31.3 Table 1A.1	Pass

When stress concentrations and cyclic loads are a concern, detailed analysis is required. With complete FEA analysis of Bonney Forge Olets® a proper design can be supplied which provides the strength required to meet any demanding service or application.

Along with detailed area replacement calculations when burst testing is not sufficient per the piping code, Bonney Forge is ready to supply the branch connection you need for your project.



WHEN & WHY

**MADE FROM
QUALITY FORGED
MATERIAL**

**CODE COMPLIANT
REINFORCEMENT**

**FUNNELED BORE ALLOWS FOR
SMOOTHER FLOW CONDITION
AND BROADER DISTRIBUTION
OF STRESSES**

**INTEGRATED WELD LINE
MEANS NO GUESSING ON
WELD THROAT THICKNESS**

USE OLETS® FOR BRANCH CONNECTIONS IN PLACE OF THE FOLLOWING

Welding Tees
Reinforcing Pads
Reinforcing Saddles
Unreinforced Branches

Why use olets®, because they simply cost less, allow for interior weld inspections, require less weld volume, and provide code compliant reinforcement.

OLETS SIMPLY COST LESS WHEN COMPARED TO WELDING TEES

- Olets cost 50 to 90% less
- Fabrication costs are 45 to 90% less
- More flexible method of installation
- One olet can cover a range of run pipe sizes
- Provides full fluid flow due to funnel design

WHERE A BRANCH CONNECTION IS NEEDED, USE AN OLET TO REDUCE YOUR INSTALLATION COSTS.

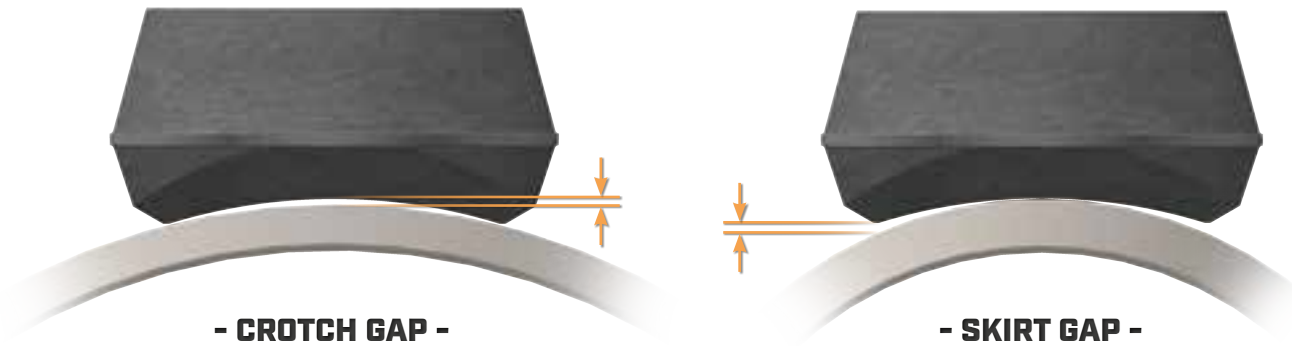
- Only require two welds
- Time to install is reduced
- Number of welds to inspect is reduced.

Because of this, the cost is lower, simply due to the reduction in time for fabrication.



INTEGRALLY REINFORCED BRANCH CONNECTIONS

MSS SP-97 ALLOWS FOR 1/16" GAPS AT THE SKIRT AND CROTCH



Run size consolidations best match the contour radius to the header pipe radius without exceeding the allowable skirt and crotch gaps.

RUN SIZE CONSOLIDATIONS



NOTES:

1. Allowable gap permits multiple size applications per outlet size
2. Contoured radius is optimized to fit as many pipe sizes as possible
3. Fittings are acceptable where skirt and crotch gap is less than 1/16"

ITEM	DESCRIPTION
1	36 - 20 x 2 3M THREDOLET
2	NPS 20 RUN PIPE
3	NPS 36 RUN PIPE

STANDARD PRODUCT DESCRIPTION

Use the following description for standard applications

- MSS SP-97 for ASME B31.1, B31.3, & ASME Section III
- Run pipe and branch pipe are the same schedule and material

36 - 22 X 4 STD WELDOLET® A105N

1 2 3 4 5

Please specify

1. Header (Run) pipe size
Header pipe is the pipe Olet® is welded onto
2. Branch pipe size
Branch pipe is the outlet size that connects to Olet®
3. Schedule/class of branch connection
STD, XS, S160, XXS, etc.
4. Style of branch connection
Weldolet®, Thredolet®, Sockolet®, Latrolet®, etc.
5. Material for branch connection
A105, A350 LF2, A182 F316/316L, Monel®



SPECIAL PRODUCT DESCRIPTION

Use the following description for all other applications

- Design codes that do not recognize MSS SP-97 (ASME B31.4, B31.8, Section I, & Section VIII, etc.)
- Mixed pipe schedules and dissimilar metals

36 - 22 (XS) X 4 (STD) FLEXOLET® A105N

1 2 3 4

Please specify

1. Header (run) pipe size
Header pipe is the pipe Olet® is welded onto
2. Branch pipe size
Branch pipe is the outlet size that connects to Olet®
3. Style of branch connection
Weldolet®, Thredolet®, Sockolet®, Latrolet®, etc.
4. Material for branch connection
A105, A350 LF2, A182 F316/316L, Monel®
5. Special design codes
Design factors, location classes, design codes



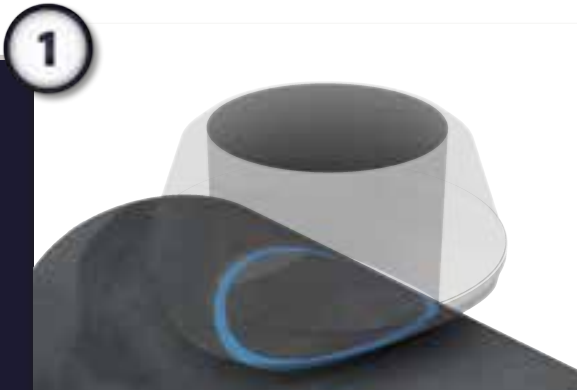
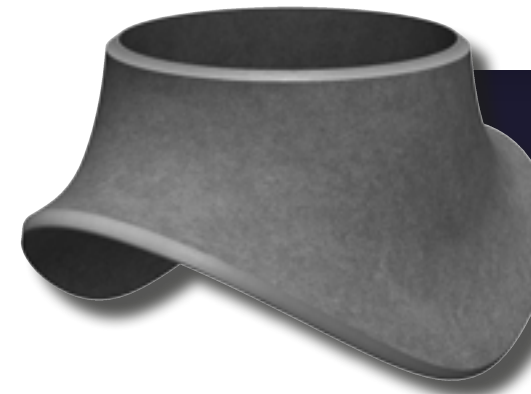
INSTALLATION PROCEDURE WELD-ON OLETS®

Olets® are provided with an integral weld line, eliminating weld thickness calculations.



INSTALLATION PROCEDURE INSERT OLETS®

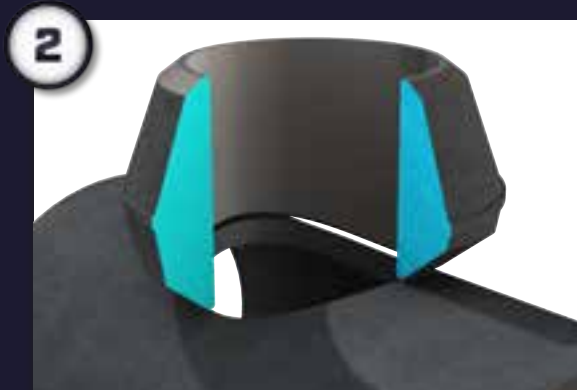
Insert Olets® provide optimal inspection opportunities for critical service.



1 Place Olet® onto pipe. Trace the ID of the Olet® onto the header pipe.



4 Tack weld at four points to secure Olet® to header pipe for groove weld.



2 Perform hole cut in pipe (*see special notes below regarding size on size*).



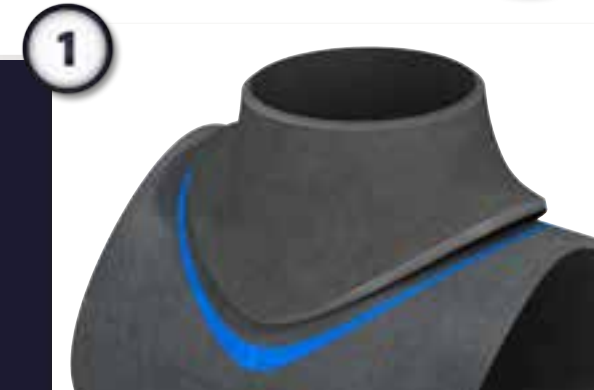
5 Perform full penetration groove weld around fitting (*completely fill weld bevel*)



3 Add spacer between header pipe and Olet® to provide root gap.



6 Apply cover fillet weld for smooth geometry transition.



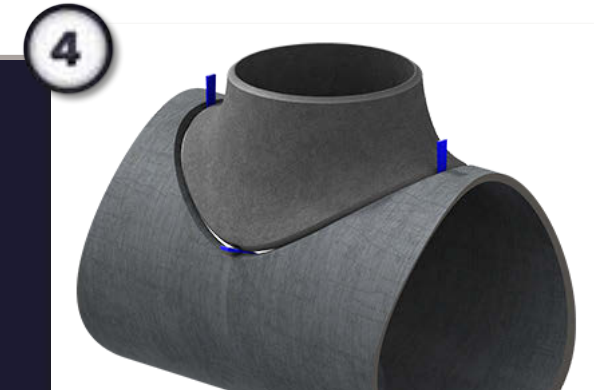
1 Layout Olet® onto pipe. Use outer-most edge as template, scribe onto header pipe.



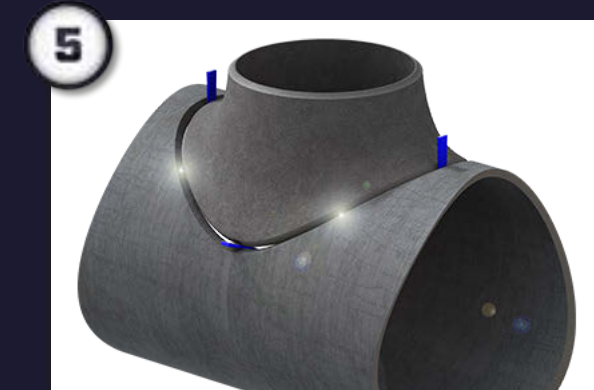
2 Cut hole using scribe line as a guide. Cut should be parallel to branch pipe axis.



3 A second cut shall be performed to obtain the required weld bevel (*per WPS*).



4 Brace Olet® and align centers before tack-welding.

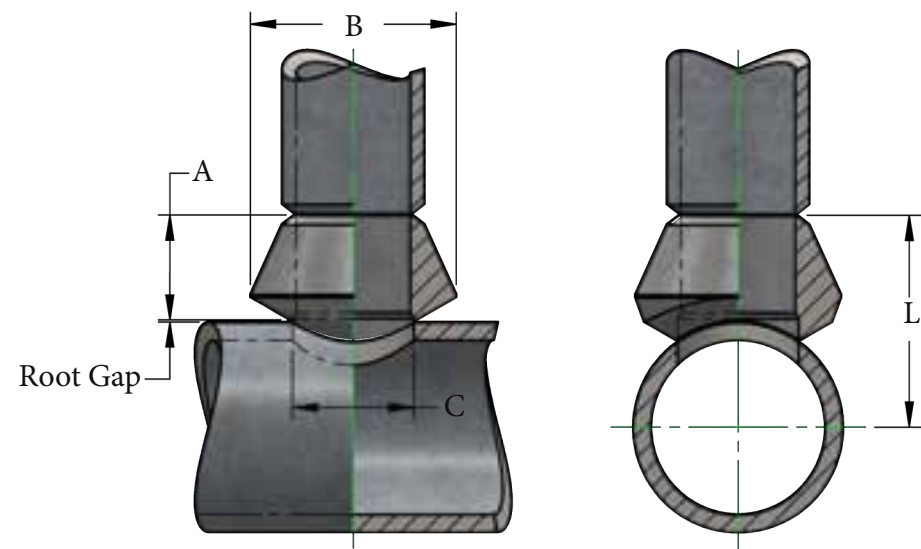


5 Tack-weld at four points to secure Olet® to header pipe.



6 Apply full penetration groove weld around Olet® (*completely fill weld bevel*)

REDUCING
STD WEIGHT



$$L = A + (\text{Run Pipe OD})/2 + \text{Root Gap}$$

Outlet Size	Dimensions			Weight
	A	B	C	
NPS 1/8	5/8	1	5/8	0.100
NPS 1/4	5/8	1	5/8	0.100
NPS 3/8	3/4	1 1/4	3/4	0.150
NPS 1/2	3/4	1 3/8	15/16	0.200
NPS 3/4	7/8	1 3/4	1 3/16	0.250
NPS 1	1 1/16	2 1/8	1 7/16	0.500
NPS 1 1/4	1 1/4	2 9/16	1 3/4	0.800
NPS 1 1/2	1 5/16	2 7/8	2	1.000
NPS 2	1 1/2	3 1/2	2 9/16	1.750
NPS 2 1/2	1 3/4	4 1/16	3	2.500
NPS 3	1 3/4	4 13/16	3 11/16	4.000
NPS 3 1/2	1 7/8	5 1/4	4	5.500
NPS 4	2	6	4 3/4	6.300
NPS 5	2 1/4	7 1/16	5 9/16	10.250
NPS 6	2 3/8	8 3/16	6 11/16	12.000
NPS 8	2 3/4	10 1/4	8 11/16	23.000
NPS 10	3 1/16	12 11/16	10 13/16	36.000
NPS 12	3 3/8	14 3/8	12 13/16	59.000
NPS 14	3 1/2	16 9/16	14 1/16	66.000
NPS 16	3 11/16	18 1/4	16 1/16	75.000
NPS 18	3 13/16	21 1/16	18 1/16	97.000
NPS 20	4	23 3/16	20	118.000
NPS 24	4 9/16	27 3/4	24 3/16	220.000
NPS 26	4 11/16	29 7/8	26 1/4	265.000
NPS 30	5 3/8	34 1/2	30 7/16	430.000
NPS 36	5 3/8	40 1/2	26 1/2	900.000

▶ * Larger outlet sizes available upon request

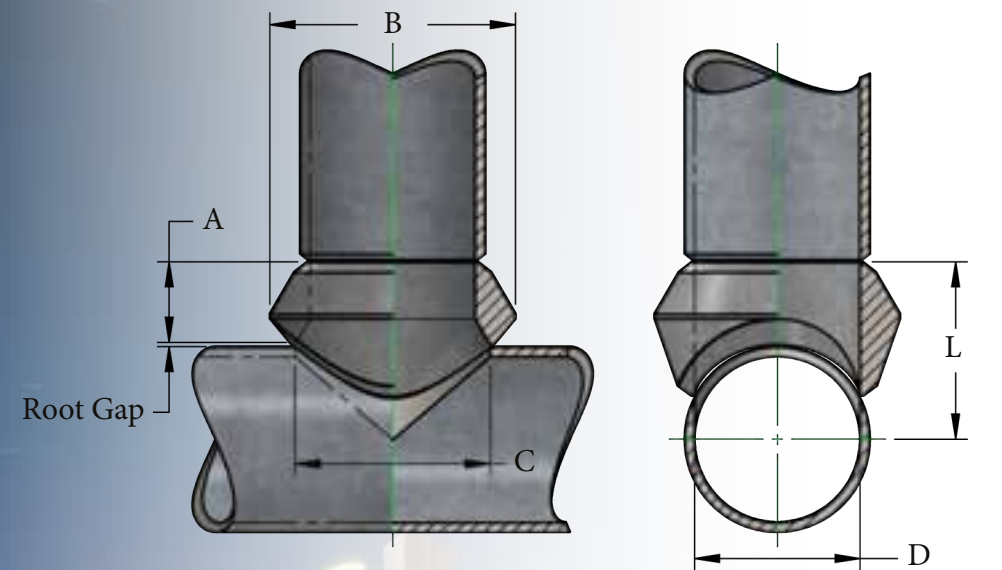
RUN SIZE CONSOLIDATIONS

Outlet Size

	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6
1/8	3/8	3/8	3/4 - 1/2	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6
1/4	1/2	1/2	36 - 1	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8
3/8	1 - 3/4	1 - 3/4	FLAT	1	1 1/2 - 1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10
1/2	2 1/2 - 1 1/4	2 1/2 - 1 1/4		1 1/2 - 1 1/4	2 1/2 - 2	2	2 1/2	3	4 - 3 1/2	4	5	6	8	10	14 - 12
3/4	36 - 3	36 - 3		2 1/2 - 2	5 - 3	2 1/2	3 1/2 - 3	4 - 3 1/2	5	5	6	8	10	12	16
1	FLAT	FLAT		8 - 3	12 - 6	3 1/2 - 3	5 - 4	6 - 5	6	8	10	14 - 12	14	14	18
1 1/4				36 - 10	36 - 14	5 - 4	8 - 6	12 - 8	10 - 8	8	10	14 - 12	20 - 16	18 - 16	22 - 20
1 1/2				FLAT	FLAT	10 - 6	18 - 10	24 - 14	18 - 12	12 - 10	14 - 12	20 - 16	22	22 - 20	28 - 24
2						36 - 12	36 - 20	36 - 26	36 - 20	18 - 14	20 - 16	36 - 24	36 - 24	28 - 24	36 - 30
2 1/2						FLAT	FLAT	FLAT	FLAT	36 - 20	36 - 24	FLAT	FLAT	36 - 30	FLAT

▶ * For outlet sizes NPS 8 and larger, order to specific run size required.

▶ * A FLAT Weldolet can be used for connections to pipe larger than NPS 36, welding caps, elliptical heads and flat surfaces.



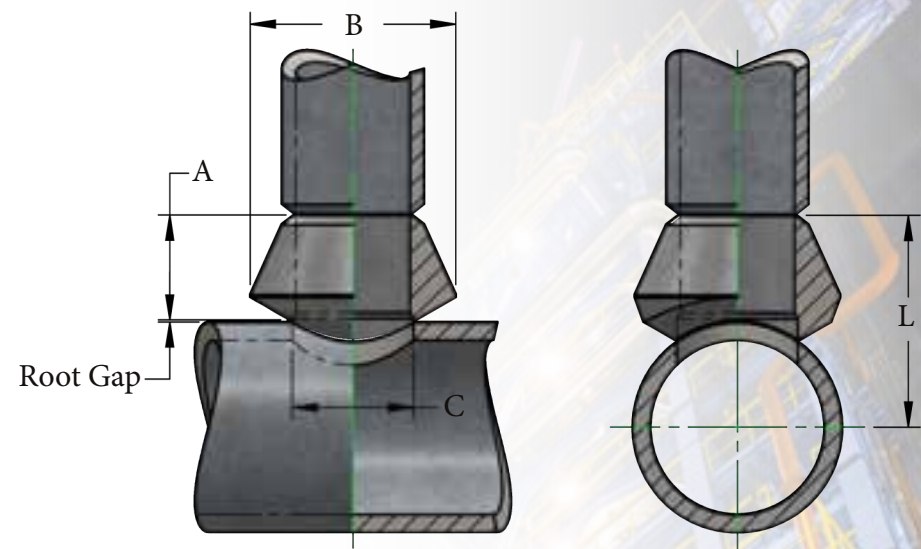
$$L = A + (\text{Run Pipe OD})/2 + \text{Root Gap}$$

Outlet Size	Dimensions				Weight
	A	B	C	D	
NPS 1/2	3/4	1 3/8	15/16	3/8	0.150
NPS 3/4	7/8	1 3/8	1 3/16	13/16	0.250
NPS 1	1 1/16	2 1/8	1 7/16	1 1/2	0.400
NPS 1 1/4	1 1/4	2 3/8	1 3/4	1 3/8	0.700
NPS 1 1/2	1 5/16	2 7/8	2	1 3/8	0.800
NPS 2	1 1/2	3 1/2	2 9/16	2 1/16	1.500
NPS 2 1/2	1 3/4	4 1/16	3	2 7/16	2.250
NPS 3	1 3/4	4 13/16	3 11/16	3 1/16	3.750
NPS 3 1/2	2	5 3/8	3 7/8	3 1/16	5.000
NPS 4	2	6	4 3/4	4	6.700
NPS 5	2 1/4	7 1/8	5 9/16	5 1/16	8.500
NPS 6	2 3/8	7 3/4	6 11/16	6 1/16	14.000
NPS 8	2 3/4	10 3/8	8 11/16	7 15/16	28.000
NPS 10	3 1/16	13	10 13/16	10	39.000
NPS 12	3 3/8	15 1/4	12 13/16	12	65.000
NPS 14	3 1/2	16 1/2	14 1/16	13 3/4	70.000
NPS 16	3 11/16	18 7/8	16 1/16	15 3/4	92.000
NPS 18	4 1/16	20 3/4	18 3/8	17 1/4	125.000
NPS 20	4 3/8	23 1/16	20 1/16	19 3/4	175.000
NPS 24	5 3/8	27 7/8	25 1/8	23 3/4	280.000
NPS 30	5 3/8	34 1/16	30 7/16	29 3/4	440.000
NPS 36	5 3/8	40 1/2	36 1/2	35 3/4	1,180.000



**DESIGN PER MSS SP-97
BUTT-WELD PER ASME B16.9 & B16.25**

**REDUCING
EXTRA STRONG**



$$L = A + (\text{Run Pipe OD})/2 + \text{Root Gap}$$

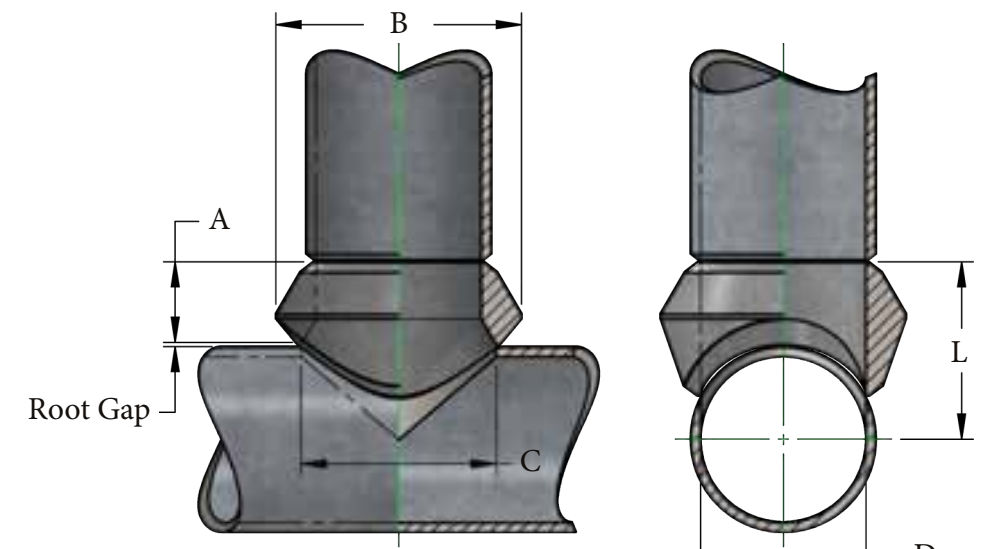
Outlet Size	Dimensions			Weight
	A	B	C	
NPS 1/8	3/8	1	5/8	0.100
NPS 1/4	3/8	1	5/8	0.100
NPS 3/8	3/4	1 1/4	3/4	0.150
NPS 1/2	3/4	1 3/8	15/16	0.200
NPS 3/4	7/8	1 3/4	1 3/16	0.300
NPS 1	1 1/16	2 1/8	1 7/16	0.500
NPS 1 1/4	1 1/4	2 9/16	1 3/4	0.900
NPS 1 1/2	1 5/16	2 7/8	2	1.100
NPS 2	1 1/2	3 1/2	2 9/16	1.750
NPS 2 1/2	1 3/4	4 1/16	3	2.600
NPS 3	1 3/4	4 13/16	3 11/16	4.100
NPS 3 1/2	1 7/8	5 1/4	4	5.600
NPS 4	2	6	4 3/4	6.400
NPS 5	2 1/4	7 1/16	5 9/16	10.400
NPS 6	3 1/16	8 5/16	6 11/16	23.000
NPS 8	3 7/8	11 1/2	8 11/16	37.000
NPS 10	3 11/16	13 3/16	10 7/16	46.000
NPS 12	4 1/16	15 3/8	12 1/2	61.000
NPS 14	3 15/16	16	13	70.000
NPS 16	4 3/16	18 3/8	15	102.000
NPS 18	4 3/8	20 3/8	17	130.000
NPS 20	4 11/16	22 15/16	19	158.000
NPS 24	5 1/2	28 1/2	24 3/16	290.000
NPS 26	5 3/4	30 1/8	27 1/4	350.000

► * Larger outlet sizes available upon request

RUN SIZE CONSOLIDATIONS
Outlet Size

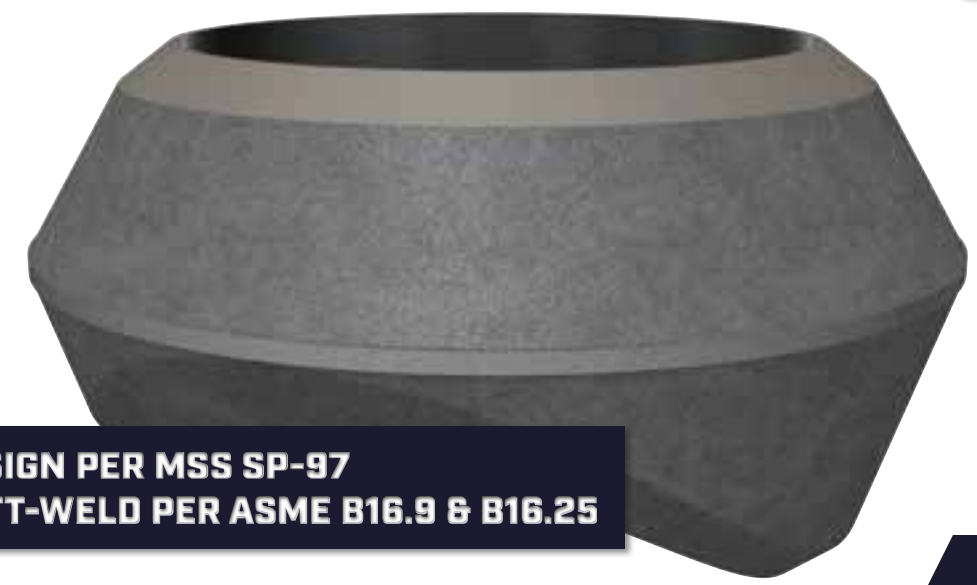
Run Size	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6
1/8	3/8	3/8	3/4 - 1/2	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6
1/4	1/2	1/2	36 - 1	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8
3/8	1 - 3/4	1 - 3/4	FLAT	1	1 1/2 - 1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10
1/2	2 1/2 - 1 1/4	2 1/2 - 1 1/4		1 1/2 - 1 1/4	2 1/2 - 2	2	2 1/2	3	4 - 3 1/2	4	5	6	8	10	14 - 12
3/4	36 - 3	36 - 3		2 1/2 - 2	5 - 3	2 1/2	3 1/2 - 3	4 - 3 1/2	5	5	6	8	10	12	16
1	FLAT	FLAT		8 - 3	12 - 6	3 1/2 - 3	5 - 4	6 - 5	6	8	10	10	14 - 12	14	18
1 1/4				36 - 10	36 - 14	5 - 4	8 - 6	12 - 8	10 - 8	8	10	14 - 12	20 - 16	18 - 16	22 - 20
1 1/2				FLAT	FLAT	10 - 6	18 - 10	24 - 14	18 - 12	12 - 10	14 - 12	20 - 16	22	22 - 20	28 - 24
2						36 - 12	36 - 20	36 - 26	36 - 20	18 - 14	20 - 16	36 - 24	36 - 24	28 - 24	36 - 30
2 1/2						FLAT	FLAT	FLAT	FLAT	36 - 20	36 - 24	FLAT	FLAT	36 - 30	FLAT
3										FLAT	FLAT	FLAT	FLAT	FLAT	FLAT

► * For outlet sizes NPS 8 and larger, order to specific run size required.
 ► * A FLAT Weldolet can be used for connections to pipe larger than NPS 36, welding caps, elliptical heads and flat surfaces.



$$L = A + (\text{Run Pipe OD})/2 + \text{Root Gap}$$

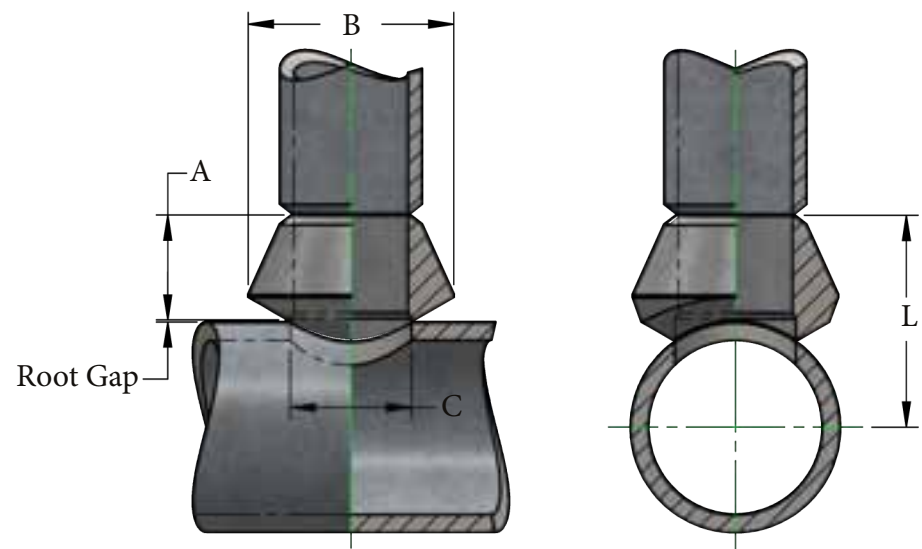
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	A	B	C	D	
NPS 1/2	3/4	1 3/8	15/16	3/8	0.150
NPS 3/4	7/8	1 3/8	1 1/16	13/16	0.250
NPS 1	1 1/16	2 3/8	1 7/16	1 1/32	0.400
NPS 1 1/4	1 1/4	2 3/8	1 3/4	1 3/8	0.700
NPS 1 1/2	1 5/16	2 7/8	2	1 3/8	0.900
NPS 2	1 1/2	3 1/2	2 9/16	2 1/16	1.600
NPS 2 1/2	1 5/8	4 1/16	3	2 7/16	2.500
NPS 3	1 3/4	4 13/16	3 11/16	3 1/16	4.100
NPS 3 1/2	2	5 3/8	3 3/8	3 1/16	5.100
NPS 4	2	6	4 3/4	4	7.500
NPS 5	2 1/4	7 3/8	5 9/16	5 1/16	9.500
NPS 6	3 1/16	8 5/16	6 11/16	6 1/16	15.000
NPS 8	3 7/8	10 3/8	8 11/16	7 3/8	32.000
NPS 10	3 1/2	13 3/8	10 7/16	9 3/4	46.000
NPS 12	3 15/16	15 3/16	13	11 3/4	61.000
NPS 14	4 3/8	16	13	13	75.000
NPS 16	4 7/16	18 1/4	15	15	115.000
NPS 18	4 11/16	20 3/8	17	17	130.000
NPS 20	5	22 3/8	19	19	187.000
NPS 24	5 1/2	28 3/4	25 1/8	23	316.000



**DESIGN PER MSS SP-97
BUTT-WELD PER ASME B16.9 & B16.25**



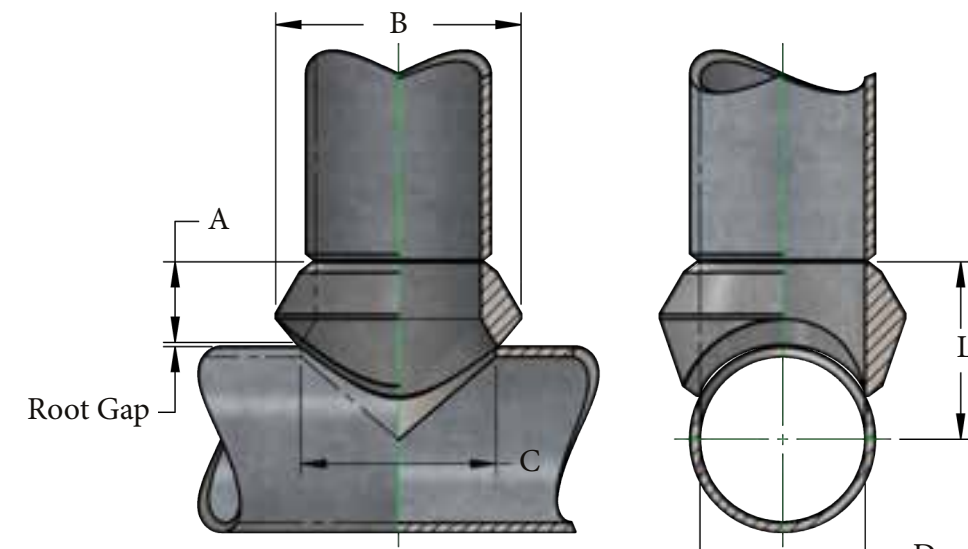
**SIZE ON SIZE
XS WEIGHT**



$$L = A + (\text{Run Pipe OD})/2 + \text{Root Gap}$$

Outlet Size	Dimensions			Weight
	A	B	C	
NPS ½	1 ¼	1 ¾	⅞	0.250
NPS ¾	1 ¼	1 ¾	¾	0.700
NPS 1	1 ½	2	1	0.850
NPS 1 ¼	1 ¾	2 ⅞	1 ⅝	1.250
NPS 1 ½	2	2 ¾	1 ½	1.750
NPS 2	2 ⅞	3 ⅞	1 ⅞	2.150
NPS 2 ½	2 ⅞	3 ⅞	2 ½	3.400
NPS 3	2 ¾	4 ¾	2 ¾	6.300
NPS 4	3 ⅞	6	3 ¾	10.500
NPS 5	3 ⅞	7 ¾	4 ⅞	14.250
NPS 6	4 ¾	9 ⅞	5 ¾	28.000

► Larger outlet sizes available upon request



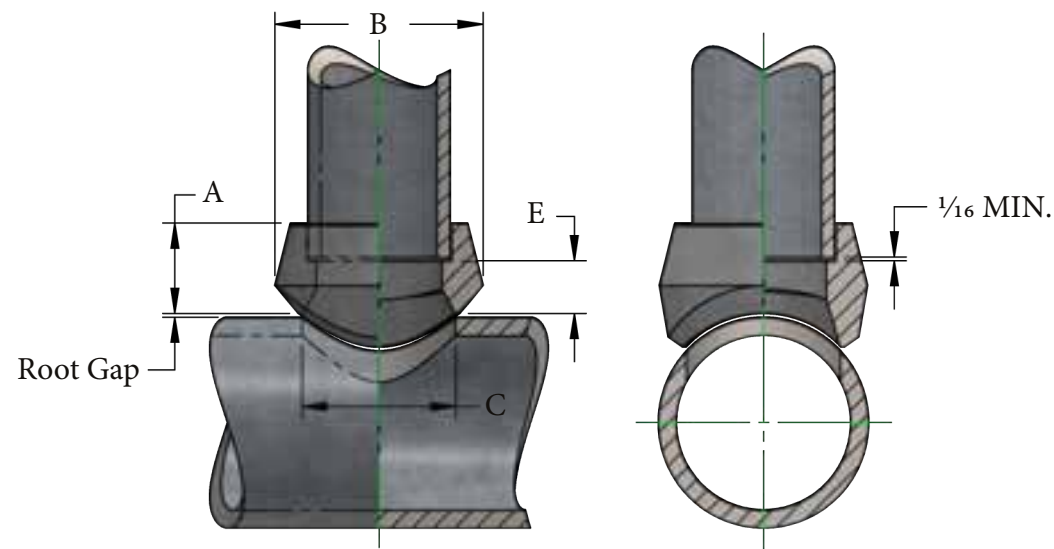
$$L = A + (\text{Run Pipe OD})/2 + \text{Root Gap}$$

Outlet Size	Dimensions				Weight
	A	B	C	D	
NPS ½	1 ¼	1 ¾	⅞	⅞	0.250
NPS ¾	1 ¼	1 ¾	¾	¾	0.700
NPS 1	1 ½	2	1	1 ⅛	0.800
NPS 1 ¼	1 ¾	2 ⅞	1 ⅝	1 ¾	1.250
NPS 1 ½	2	2 ¾	1 ½	1 ⅞	1.750
NPS 2	2 ⅞	3 ⅞	1 ⅞	1 ½	2.150
NPS 2 ½	2 ⅞	3 ⅞	2 ½	1 ¾	3.400
NPS 3	2 ¾	4 ¾	2 ¾	2 ¾	6.350
NPS 4	3 ⅞	6	3 ¾	3 ⅞	10.500
NPS 5	3 ⅞	7 ¾	4 ⅞	4 ⅞	14.250
NPS 6	4 ¾	8 ⅞	5 ¾	5 ⅞	30.250



RUN SIZE CONSOLIDATIONS									
Outlet Size									
	½	¾	1	1 ¼	1 ½	2	2 ½	3	4
RUN SIZES	½	1 - ¾	1	1 ½ - 1 ¼	1 ½	2	2 ½	3	4
	1 ¼ - ¾	2 - 1 ¼	2 ½ - 1 ¼	2 ½ - 2	2 ½ - 2	2 ½	3	3 ½	6
	36 - 1 ½	6 - 2 ½	10 - 3	10 - 3	3 ½ - 3	3 ½ - 3	3 ½	4	8
	FLAT	36 - 8	36 - 12	36 - 12	8 - 4	5 - 4	4	5	10
		FLAT	FLAT	FLAT	20 - 10	8 - 6	5	6	12
					22	18 - 10	8 - 6	8	14
					36 - 24	36 - 20	12 - 10	10	16
					FLAT	FLAT	18 - 14	12	18
							36 - 20	14	20
							FLAT	16	22
							18	24	
							20	FLAT	
							22		
							24		
							FLAT		

► For outlet sizes NPS 5 and larger, order to specific run size required.
 ► A FLAT Weldolet can be used for connections to pipe larger than NPS 36, welding caps, elliptical heads and flat surfaces.

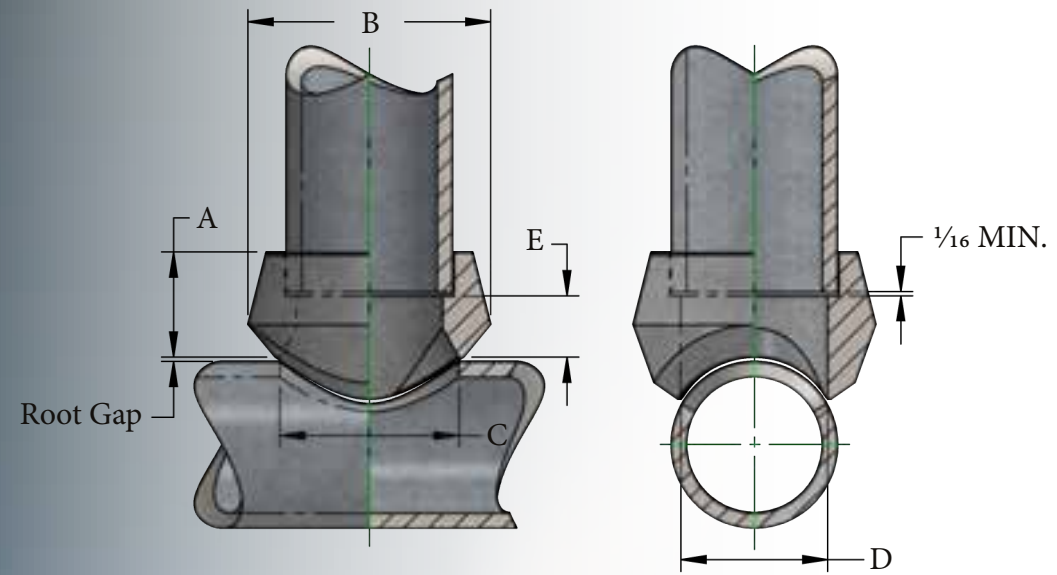


Outlet Size	Dimensions				Weight
	A	B	C	E	
CLASS 3000					
NPS 1/8	3/4	1	3/8	5/16	0.100
NPS 1/4	3/4	1	3/8	5/16	0.100
NPS 3/8	13/16	1 1/4	3/4	7/16	0.200
NPS 1/2	1	1 7/16	15/16	9/16	0.300
NPS 3/4	1 1/16	1 3/4	1 3/16	9/16	0.350
NPS 1	1 1/16	2 1/8	1 7/16	13/16	0.600
NPS 1 1/4	1 5/16	2 9/16	1 3/4	3/4	0.850
NPS 1 1/2	1 3/8	2 7/8	2	3/4	1.000
NPS 2	1 1/2	3 1/2	2 9/16	13/16	1.600
NPS 2 1/2	1 13/16	4 1/16	3	3/4	2.750
NPS 3	2	4 13/16	3 11/16	15/16	3.800
NPS 3 1/2	2 1/8	5 3/8	4	1	4.300
NPS 4	2 1/4	6	4 3/4	1 1/16	7.250
NPS 5	2 5/8	7	5 5/16	1 3/8	12.000
NPS 6	2 3/4	8 3/8	6 11/16	1 7/16	14.500
CLASS 6000					
NPS 1/2	1 1/4	1 3/4	3/4	7/8	0.500
NPS 3/4	1 7/16	2	1	7/8	0.800
NPS 1	1 9/16	2 7/16	1 5/16	15/16	1.300
NPS 1 1/4	1 3/8	2 3/4	1 1/2	13/16	1.600
NPS 1 1/2	1 11/16	3 1/4	1 15/16	7/8	2.000
NPS 2	2 1/16	4 1/16	2 3/4	1 3/16	5.150
CLASS 9000					
NPS 1/2	1 1/4	1 11/16	3/4	13/16	
NPS 3/4	1 7/16	1 15/16	15/16	7/8	
NPS 1	1 9/16	2 9/16	1 3/16	15/16	
NPS 1 1/4	1 3/8	2 11/16	1 1/2	13/16	
NPS 1 1/2	1 11/16	3 1/4	1 15/16	15/16	
NPS 2	2 1/16	4 1/16	2 3/4	1 1/4	

RUN SIZE CONSOLIDATIONS - CLASS 3000

RUN SIZES	Outlet Size														
	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6
	3/8	3/8	1/2	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6
	1 - 3/4	1 - 3/4	1 - 3/4	1	1 1/2 - 1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10
	2 1/2 - 1 1/4	2 1/2 - 1 1/4	36 - 3	1 1/2 - 1 1/4	2 1/2 - 2	2	2 1/2	3	4 - 3 1/2	4	5	6	8	10	14 - 12
	36 - 3	36 - 3	FLAT	2 1/2 - 2	5 - 3	2 1/2	3 1/2 - 3	4 - 3 1/2	5	5	6	8	10	12	16
	FLAT	FLAT		8 - 3	12 - 6	3 1/2 - 3	5 - 4	6 - 5	6	6	8	10	14 - 12	14	18
				36 - 10	36 - 14	5 - 4	8 - 6	12 - 8	10 - 8	8	10	14 - 12	20 - 16	18 - 16	22 - 20
				FLAT	FLAT	10 - 6	18 - 10	24 - 14	18 - 12	12 - 10	14 - 12	20 - 16	22	22 - 20	28 - 24
						36 - 12	36 - 20	36 - 26	36 - 20	18 - 14	20 - 16	36 - 24	36 - 24	28 - 24	36 - 30
						FLAT	FLAT	FLAT	FLAT	36 - 20	36 - 24	FLAT	FLAT	36 - 30	FLAT

▶ A FLAT Sockolet can be used for connections to pipe larger than NPS 36, welding caps, elliptical heads and flat surfaces.



Outlet Size	Dimensions				E	Weight
	A	B	C	D		
NPS 1/2	1	1 3/8	15/16	0.622	9/16	0.150
NPS 3/4	1 1/16	1 3/8	1 3/16	0.824	1/2	0.250
NPS 1	1 5/16	2 1/8	1 7/16	1.049	3/4	0.450
NPS 1 1/4	1 5/16	2 7/16	1 3/4	1.380	9/16	0.650
NPS 1 1/2	1 3/8	2 7/8	2	1.610	1 1/16	0.850
NPS 2	1 1/2	3 1/2	2 9/16	2.067	15/16	1.400
NPS 2 1/2	1 9/16	4 1/16	3	2.469	3/4	2.250
NPS 3	1 3/4	4 13/16	3 11/16	3.068	15/16	3.750
NPS 3 1/2	1 11/16	5 3/8	4 7/16	3.548	1 1/16	4.300
NPS 4	1 7/8	6 1/16	4 3/4	4.026	1 1/16	6.600
NPS 5	2 7/16	7 1/4	5 1/4	5.047	1	9.000
NPS 6	2 11/16	8 11/16	6 1/16	6.065	1 3/16	15.500

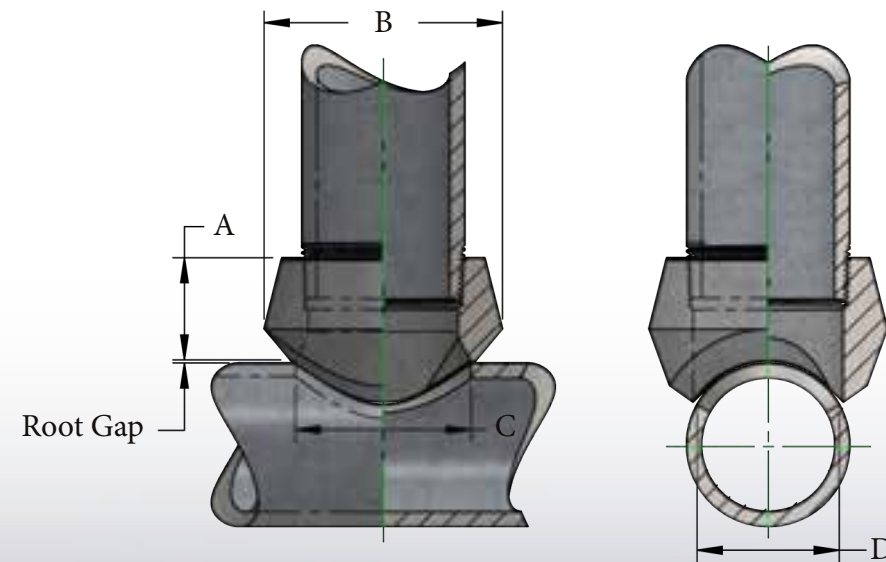
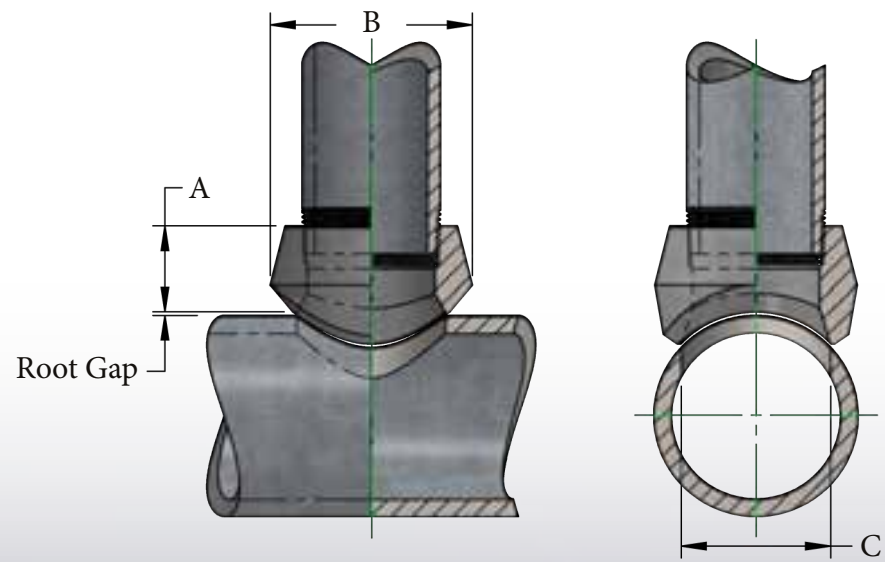
RUN SIZE CONSOLIDATIONS - CLASS 6000

RUN SIZES	Outlet Size					
	1/2	3/4	1	1 1/4	1 1/2	2
	1 - 3/4	1	1 1/2 - 1 1/4	1 1/2	2	2 1/2
	2 - 1 1/4	2 1/2 - 1 1/4	2 1/2 - 2	2 1/2 - 2	2 1/2	3
	6 - 2 1/2	10 - 3	10 - 3	3 1/2 - 3	3 1/2 - 3	4
	36 - 8	36 - 12	36 - 12	8 - 4	5 - 4	5
	FLAT	FLAT	FLAT	36 - 10	8 - 6	6
				FLAT	18 - 10	10 - 8
					36 - 20	20 - 12
					FLAT	36 - 24
						FLAT

RUN SIZE CONSOLIDATIONS - CLASS 9000

RUN SIZES	Outlet Size					
	1/2	3/4	1	1 1/4	1 1/2	2
	1 - 3/4	1	1 1/2 - 1 1/4	1 1/2	2	2 1/2
	2 - 1 1/4	2 1/2 - 1 1/4	2 1/2 - 2	2 1/2 - 2	2 1/2	4 - 3
	6 - 2 1/2	10 - 3	10 - 3	3 1/2 - 3	3 1/2 - 3	6 - 5
	36 - 8	36 - 12	36 - 12	8 - 4	5 - 4	14 - 8
	FLAT	FLAT	FLAT	36 - 10	10 - 6	36 - 16
				FLAT	36 - 12	FLAT
					FLAT	





Outlet Size	Dimensions			Weight
	A	B	C	
CLASS 3000				
NPS 1/8	3/8	1	3/8	0.100
NPS 1/4	3/8	1	3/8	0.100
NPS 3/8	13/16	1 1/4	3/4	0.200
NPS 1/2	1	1 7/16	15/16	0.250
NPS 3/4	1 1/16	1 3/4	1 3/16	0.350
NPS 1	1 5/16	2 1/2	1 7/16	0.600
NPS 1 1/4	1 5/16	2 9/16	1 3/4	0.900
NPS 1 1/2	1 3/8	2 7/16	2	1.000
NPS 2	1 1/2	3 1/2	2 9/16	1.750
NPS 2 1/2	1 13/16	4 1/16	3	3.000
NPS 3	2	4 13/16	3 11/16	4.350
NPS 3 1/2	2 1/8	5 1/4	4	5.750
NPS 4	2 1/4	6	4 3/4	7.100
NPS 5	2 3/8	7 5/16	5 9/16	12.000
NPS 6	2 3/4	8 3/8	6 11/16	15.300
CLASS 6000				
NPS 1/4	1 1/8	1 3/8	9/16	0.300
NPS 3/8	1 1/8	1 3/8	9/16	0.300
NPS 1/2	1 1/4	1 3/4	3/4	0.450
NPS 3/4	1 7/16	2	1	0.750
NPS 1	1 9/16	2 7/16	1 5/16	1.250
NPS 1 1/4	1 3/8	2 3/4	1 1/2	1.600
NPS 1 1/2	1 11/16	3 1/4	1 13/16	1.950
NPS 2	2 1/16	4 1/16	2 3/4	5.000

Outlet Size	Dimensions				Weight
	A	B	C	D	
NPS 1/2	1	1 3/8	15/16	3/8	0.150
NPS 3/4	1 1/16	1 11/16	1 3/16	13/16	0.250
NPS 1	1 5/16	2 1/8	1 7/16	1 1/16	0.450
NPS 1 1/4	1 5/16	2 3/8	1 3/4	1 3/8	0.700
NPS 1 1/2	1 3/8	2 7/8	2	1 3/8	0.900
NPS 2	1 1/2	3 1/2	2 9/16	2 1/16	1.400
NPS 2 1/2	1 15/16	4 1/16	3	2 1/2	2.500
NPS 3	2	4 13/16	3 11/16	3 1/16	4.300
NPS 3 1/2	2 1/8	5 3/8	4 7/16	3 9/16	4.500
NPS 4	2 1/4	6	4 3/4	4 1/16	6.800
NPS 5	2 7/16	7 1/4	5 1/4	5 1/4	9.200
NPS 6	2 3/4	8 11/16	5 3/4	5 3/4	15.700



RUN SIZE CONSOLIDATIONS - CLASS 3000
Outlet Size

Run Size	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6
1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8
1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8
1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4
1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
FLAT	FLAT	FLAT	FLAT	FLAT	FLAT	FLAT	FLAT	FLAT	FLAT	FLAT	FLAT	FLAT	FLAT	FLAT	FLAT

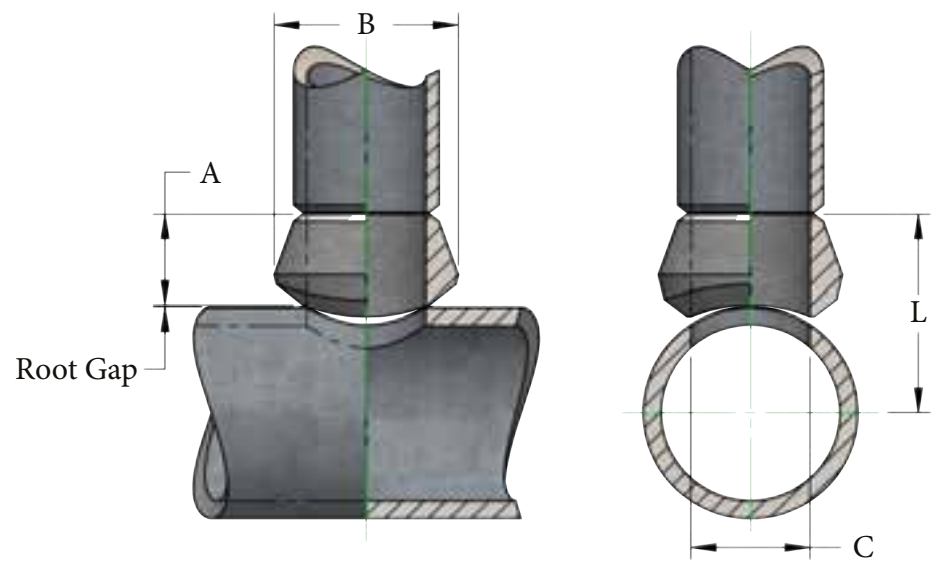
RUN SIZE CONSOLIDATIONS - CLASS 6000
Outlet Size

Run Size	1/2	3/4	1	1 1/4	1 1/2	2
1/2	1/2	1/2	1/2	1/2	1/2	1/2
3/4	3/4	3/4	3/4	3/4	3/4	3/4
1	1	1	1	1	1	1
1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4
1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
2	2	2	2	2	2	2
FLAT	FLAT	FLAT	FLAT	FLAT	FLAT	FLAT

▶ A FLAT Thredolet can be used for connections to pipe larger than NPS 36, welding caps, elliptical heads and flat surfaces.

DESIGN PER MSS SP-97
NPT THREADS PER ASME B1.20.1

**BUTT-WELD
STD WEIGHT &
EXTRA STRONG**



$$L = A + (\text{Run Pipe OD})/2 + \text{Root Gap}$$

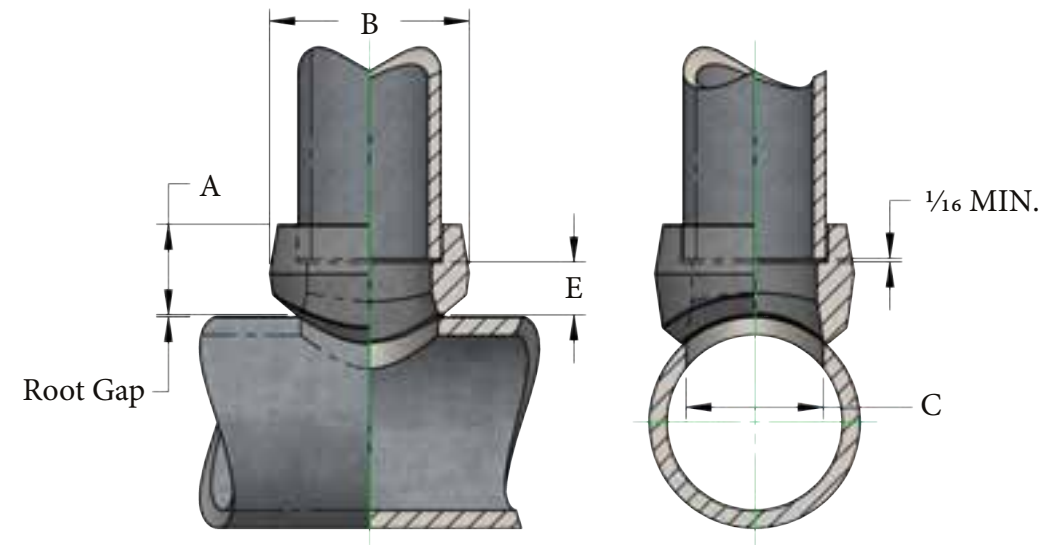
	Outlet Size	Dimensions			Weight
		A	B	C	
STD Weight	NPS 3/8	3/8	1	0.493	0.100
	NPS 1/2	3/8	1 1/8	0.622	0.120
	NPS 3/4	7/8	1 1/2	0.824	0.220
	NPS 1	1 1/16	1 13/16	1.062	0.320
	NPS 1 1/4	1 1/4	2 1/4	1.380	0.640
	NPS 1 1/2	1 5/16	2 9/16	1.625	0.780
	NPS 2	1 1/2	3	2.062	1.140
	NPS 2 1/2	1 5/8	3 11/16	2.500	1.940
	NPS 3	1 3/4	4 5/16	3.125	2.600
	NPS 4	2	5 3/8	4.145	4.120
NPS 6	2 3/8	7 11/16	6.112	11.000	
Extra Strong	NPS 3/8	3/8	1	0.423	0.100
	NPS 1/2	3/8	1 1/8	0.546	0.120
	NPS 3/4	7/8	1 1/2	0.742	0.180
	NPS 1	1 1/16	1 13/16	1.062	0.360
	NPS 1 1/4	1 1/4	2 1/4	1.278	0.550
	NPS 1 1/2	1 5/16	2 9/16	1.625	0.680
	NPS 2	1 1/2	3	2.062	1.240
	NPS 2 1/2	1 5/8	3 11/16	2.500	2.260
	NPS 3	1 3/4	4 5/16	3.125	2.840
	NPS 4	2	5 3/8	4.145	4.560
NPS 6	3 1/16	7 3/4	5.800	15.000	

RUN SIZE CONSOLIDATIONS - STD Weight												
Outlet Size												
	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	6
RUN SIZES	36 - 3/8	36 - 3/4	36 - 1 1/4	36 - 2 1/2	36 - 2	36 - 2 1/2	36 - 4	36 - 8	36 - 12	36 - 16	36 - 22	42 - 36

▶ FLAT Flexolet branch connections for use on welding caps, elliptical heads, and flat surfaces is available upon request.

RUN SIZE CONSOLIDATIONS - Extra Strong												
Outlet Size												
	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	6
RUN SIZES	36 - 1/4	36 - 1/2	36 - 1	36 - 2	36 - 2	36 - 6	36 - 4	36 - 8	36 - 12	36 - 16	36 - 22	42 - 36

▶ FLAT Flexolet branch connections for use on welding caps, elliptical heads, and flat surfaces is available upon request.



	Outlet Size	Dimensions				Weight
		A	B	C	E	
CLASS 3000	NPS 1/4	3/8	1	0.364	3/8	0.140
	NPS 3/8	13/16	1 1/16	0.493	7/16	0.140
	NPS 1/2	1	1 1/2	0.622	9/16	0.280
	NPS 3/4	1 1/16	1 13/16	0.824	9/16	0.390
	NPS 1	1 5/16	2 1/8	1.049	13/16	0.730
	NPS 1 1/4	1 5/16	2 9/16	1.380	3/4	0.960
	NPS 1 1/2	1 3/8	2 13/16	1.610	3/4	1.120
	NPS 2	1 1/2	3 5/16	2.067	13/16	1.660
	NPS 2 1/2	1 13/16	3 13/16	2.469	3/4	2.730
	NPS 3	2	4 11/16	3.068	15/16	3.880
NPS 4	2 1/4	5 13/16	4.026	1 1/16	6.600	
CLASS 6000	NPS 1/2	1 1/4	1 3/4	0.464	13/16	0.280
	NPS 3/4	1 7/16	2 1/16	0.612	15/16	0.390
	NPS 1	1 9/16	2 3/16	0.815	1	0.730
	NPS 1 1/4	1 3/8	2 1/2	1.160	1	0.960
	NPS 1 1/2	1 11/16	3 5/16	1.338	1 1/16	1.630
	NPS 2	2 1/16	4	1.687	1 3/8	1.660
CLASS 9000	NPS 1/2	1 1/4	1 3/4	0.252	13/16	
	NPS 3/4	1 7/16	1 7/8	0.434	7/8	
	NPS 1	1 9/16	2 1/4	0.599	1	
	NPS 1 1/4	1 5/8	2 3/4	0.896	1 1/16	
	NPS 1 1/2	1 11/16	3	1.100	1 3/8	
	NPS 2	2 1/16	3 1/2	1.503	1 3/8	

RUN SIZE CONSOLIDATIONS - CLASS 3000												
Outlet Size												
	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	6
RUN SIZES	36 - 3/8	36 - 3/4	36 - 3/4	36 - 1 1/2	36 - 3	36 - 4	36 - 6	36 - 8	36 - 8	36 - 16	36 - 22	42 - 36

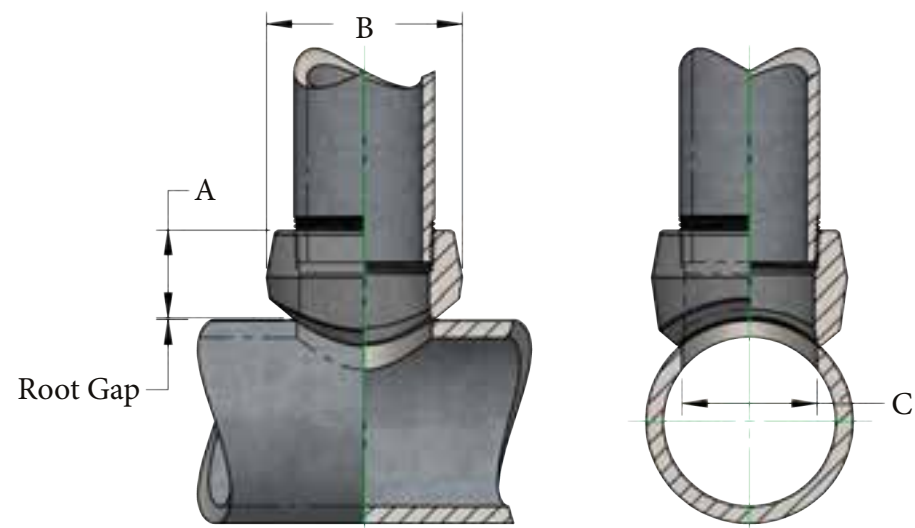
▶ FLAT Flexolet branch connections for use on welding caps, elliptical heads, and flat surfaces are available upon request.

RUN SIZE CONSOLIDATIONS - CLASS 6000						
Outlet Size						
	1/2	3/4	1	1 1/4	1 1/2	2
RUN SIZES	36 - 3/4	36 - 1 1/4	36 - 3	36 - 5	36 - 6	36 - 8

RUN SIZE CONSOLIDATIONS - CLASS 9000						
Outlet Size						
	1/2	3/4	1	1 1/4	1 1/2	2
RUN SIZES	36 - 1/2	36 - 3/4	36 - 1 1/4	36 - 3	36 - 5	36 - 10

**SOCKET-WELD
CLASS 3000, 6000
& 9000**



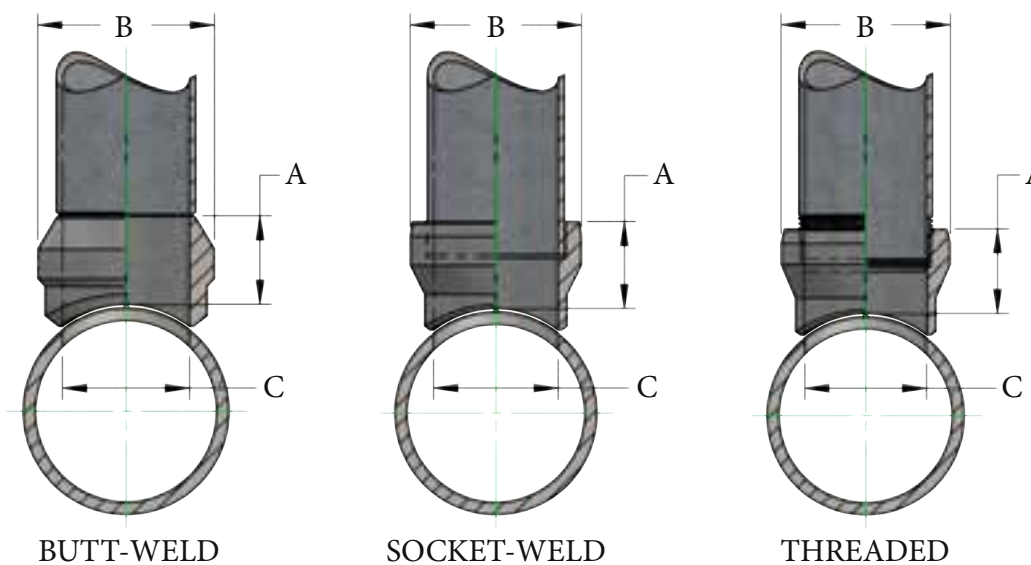


Outlet Size	Dimensions			Weight	
	A	B	C		
CLASS 3000	NPS ¼	¾	1 ½	0.437	0.140
	NPS ⅜	1 ¼	1 ½	0.578	0.140
	NPS ½	1	1 ½	0.718	0.280
	NPS ¾	1 ½	1 ¾	0.922	0.390
	NPS 1	1 ¾	2 ½	1.156	0.730
	NPS 1 ¼	1 ¾	2 ½	1.500	0.960
	NPS 1 ½	1 ¾	2 ¾	1.734	1.120
	NPS 2	1 ½	3 ¼	2.218	1.660
	NPS 2 ½	1 ¾	3 ¾	2.625	2.730
	NPS 3	2	4 ¾	3.250	3.880
NPS 4	2 ¼	5 ¾	4.250	6.180	
CLASS 6000	NPS ¼	¾	1 ½	0.437	0.140
	NPS ⅜	1 ¼	1 ½	0.578	0.140
	NPS ½	1 ¼	1 ¾	0.718	0.280
	NPS ¾	1 ¾	2 ½	0.922	0.390
	NPS 1	1 ¾	2 ½	1.156	0.730
	NPS 1 ¼	1 ¾	2 ½	1.500	0.960
	NPS 1 ½	1 ¾	3 ¼	1.734	1.120
	NPS 2	2 ¼	4	2.218	1.660

RUN SIZE CONSOLIDATIONS - CLASS 3000											
Outlet Size											
RUN SIZES	¼	⅜	½	¾	1	1 ¼	1 ½	2	2 ½	3	4
		¾ - ¼	1 - ¾	¾	1 ¼ - ¾	1	1 ½ - 1 ¼	1 ½	2	2 ½	3
	36 - ½	36 - 1 ¼	36 - ¾	36 - 1 ½	2 ½ - 1 ¼	3 ½ - 2	2 ½ - 2	3 ½ - 2 ½	3 ½ - 2 ½	5 - 3 ½	6 - 5
					36 - 3	36 - 4	5 - 3	6 - 4	6 - 4	14 - 6	10 - 8
							36 - 6	36 - 8	36 - 8	36 - 16	20 - 12
											36 - 22

▶ FLAT Flexolet branch connections for use on welding caps, elliptical heads, and flat surfaces is available upon request.

RUN SIZE CONSOLIDATIONS - CLASS 6000								
Outlet Size								
RUN SIZES	¼	⅜	½	¾	1	1 ¼	1 ½	2
		¾ - ¼	1 - ¾	¾	¾	1	1 ½ - 1 ¼	1 ½
	36 - ½	36 - 1 ¼	36 - ¾	1 ¼ - 1	2 ½ - 1 ¼	3 ½ - 2	2 ½ - 2	3 ½ - 2 ½
				36 - 1 ½	36 - 3	8 - 4	5 - 3	6 - 4
						36 - 10	36 - 6	36 - 8



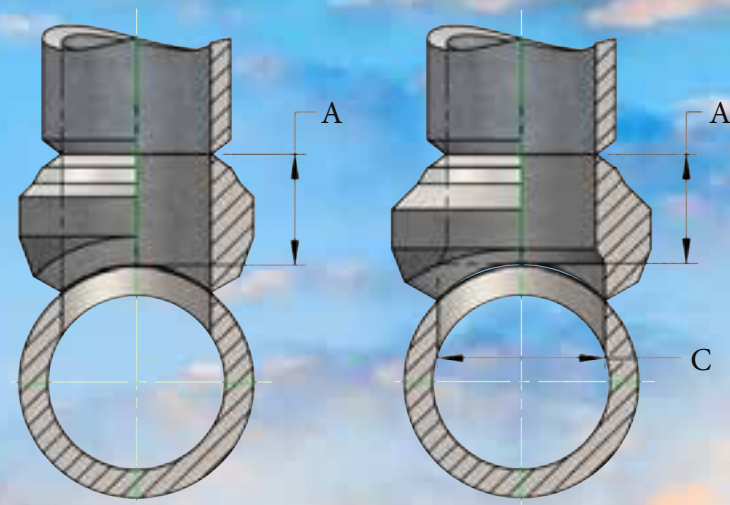
Outlet Size	Dimensions			Weight
	A	B	C	
BUTT-WELD	NPS ⅜	¾	1 ½	-
	NPS ½	¾	1 ½	-
	NPS ¾	1 ¼	1 ¾	-
	NPS 1	1 ½	2 ½	0.100
	NPS 1 ¼	1 ¾	2 ¾	0.230
	NPS 1 ½	1 ¾	2 ¾	0.260
	NPS 2	1 ½	3	0.610
	NPS 2 ½	1 ¾	3 ¾	0.780
	NPS 3	1 ¾	4	0.890
	NPS 3 ½	1 ¾	4 ½	2.170
	NPS 4	2	5	2.270
	NPS 5	2 ¼	6 ¼	4.370
NPS 6	2 ¾	7 ¼	6.090	
THREADED	NPS ½	1	1 ¼	0.250
	NPS ¾	1 ¼	1 ½	0.350
	NPS 1	1 ¼	1 ¾	0.922
	NPS 1 ¼	1 ¾	2 ¼	1.156
	NPS 1 ½	1 ¾	2 ½	1.500
NPS 2	1 ½	3	1.734	
NPS 2 ½	1 ¾	3 ¾	2.219	

C = I.D. of specified branch pipe

Outlet Size	Dimensions				Weight
	A	B	C		
			CL. 300	SCH. 5s	SCH. 10s
NPS ½	¾	1 ¼	0.622	0.710	0.674
NPS ¾	1 ¼	1 ½	0.824	0.920	0.884
NPS 1	1 ¼	1 ¾	1.049	1.185	1.097
NPS 1 ¼	1 ¾	2 ¼	1.380	1.530	1.442
NPS 1 ½	1 ¾	2 ½	1.610	1.770	1.682
NPS 2	1 ½	3	2.067	2.245	2.157

- REDUCES WELD VOLUME AND WELD TIME
- ALLOWS FULL PENETRATION WELD WITHOUT DISTORTION
- REDUCES HEAT BUILD UP
- CAN BE USED ON ALL HEADER PIPE THICKNESSES
- MEETS APPLICABLE PIPING CODES AND STANDARDS





**TYPE 1
STRAIGHT BORE**

**TYPE 2
TAPER BORE**

Run Wall Thickness	¾		1		1 ¼		1 ½		1 ¾	
Outlet Size	A	C	A	C	A	C	A	C	A	C
NPS 3	2 7/8	2.906	3 7/32	2.900	3 3/8	2.906	3 3/8	2.900	4 1/8	2.900
NPS 3 ½	3 3/8	3.359	3 1/4	3.359	3 7/16	3.359	3 3/4	3.359	4 3/16	3.359
NPS 4	3 5/16	3.843	3 3/8	3.826	3 1/2	3.828	3 7/8	3.826	4 3/4	3.826
NPS 5	3 3/4	4.812	3 3/4	4.812	4	4.812	4 1/4	4.812	4 3/4	4.812
NPS 6	4 1/8	5.750	4 11/32	5.761	4 1/2	5.760	4 11/16	5.760	5 1/4	5.760
NPS 8	4 3/16	7.625	4 3/8	7.625	4 7/8	7.625	5 3/32	7.625	5 3/4	7.625
NPS 10	4 1/4	9.750	4 27/32	9.750	5	9.562	5 5/16	9.562	5 15/16	9.562
NPS 12	4 3/8	11.750	5 3/32	11.750	5 3/8	11.375	5 11/16	11.375	6 3/16	11.375
NPS 14	4 1/2	13.000	5 1/4	13.000	5 1/2	12.500	5 13/16	12.500	6 3/16	12.500
NPS 16	4 11/16	15.000	5 7/8	15.000	6	14.312	6 7/16	14.310	6 3/8	14.310
NPS 18	5 1/8	17.000	6 1/2	17.000	6 1/2	16.125	6 1/2	16.126	6 13/16	16.126
NPS 20	5 3/8	19.000	6 3/4	19.000	7	17.937	7 1/16	17.938	7 25/32	17.938
NPS 24	6 1/2	23.000	7 5/8	23.000	8	21.564	8 23/32	21.564	8 31/32	21.564

Run Wall Thickness	2		2 ¼		2 ½		2 ¾		3	
Outlet Size	A	C	A	C	A	C	A	C	A	C
NPS 3	4 5/16	2.900	5	2.900	5 1/2	2.900	5 7/8	2.900	6 1/16	2.900
NPS 3 ½	4 3/8	3.359	5 1/16	3.359	5 5/16	3.359	6	3.359	6 3/16	3.359
NPS 4	4 3/4	3.826	5 3/16	3.826	5 5/8	3.826	6 3/8	3.826	6 3/16	3.826
NPS 5	5 1/4	4.812	5 3/4	4.812	6 1/4	4.812	6 3/8	4.812	7 3/16	4.812
NPS 6	5 3/4	5.760	6 1/4	5.760	6 3/4	5.760	7 1/4	5.760	7 13/16	5.760
NPS 8	6 11/32	7.625	6 15/16	7.625	7 17/32	7.625	8 3/32	7.625	8 11/16	7.625
NPS 10	6 3/16	9.562	7 3/16	9.562	7 13/16	9.562	8 7/16	9.562	9 1/16	9.562
NPS 12	6 15/16	11.375	7 7/16	11.375	8 3/16	11.375	8 11/16	11.375	9 7/16	11.375
NPS 14	6 15/16	12.500	7 7/16	12.500	8 3/16	12.500	8 11/16	12.500	9 7/16	12.500
NPS 16	7 1/4	14.310	7 7/8	14.310	8 1/2	14.310	9 1/8	14.310	9 3/4	14.310
NPS 18	7 7/16	16.126	8 7/32	16.126	8 13/16	16.126	9 13/32	16.126	10 1/32	16.126
NPS 20	8 3/32	17.938	8 21/32	17.938	9 1/4	17.938	9 29/32	17.938	10 15/32	17.938
NPS 24	9 13/16	21.568	10 1/2	21.568	11	21.564	12 1/16	21.564	10 21/32	21.564

► Order Heavy Wall Weldolets to specific header run sizes.

Background

The piping industry has retained the theory of "area replacement" for adequate and acceptable branch pipe reinforcement. Area replacement has been the only premise outlined by ASME piping codes for adequate reinforcement, standards have not considered the shape of the reinforcement. Some shapes are more efficient than others, and as a result, more replacement area with a poor shape may be less satisfactory than less area with an appropriate shape.

The basic methods of lap type reinforcement outlined in the piping codes are known to have serious drawbacks, namely, that the geometry creates areas of high stress concentrations. They have an inherent crack at the inside edge of the fillet weld as well as points of high stress where the pad joins the run pipe and where the nozzle intersects the pad or run.

These drawbacks are of increasing concern when high yield pipe is used and for other critical service applications such as nuclear. On softer materials such as A106 Gr. A or Gr. B pipe, the localized areas of high stress tend to be relieved by local yielding and generally do not adversely affect the serviceability of the joint unless cyclic loading is involved or there is a propensity for brittle fracture.

Design

The Sweeपोlet concept evolved from two premises, namely reinforcement must be sufficient to limit deformations and that an efficient branch construction would result from controlling the geometry of the intersection on all planes.

A Sweeपोlet provides the required stiffening (reinforcement at the most critical point, the juncture of the branch and header) with essentially no peak stresses. Owing to the aesthetic proportions of a Sweeपोlet, designers intuitively know that it is an efficient branch outlet construction - and tests have proved it.

As a result of experimental stress analyses from brittle lacquer to sophisticated and accurate 3D photoelasticity, it has been shown that the Sweeपोlet embodies quantitatively all desirable features in their optimum relationship.

Code Compliance

The ASME code committees anticipated the development of such fittings and approves their use.

ASME B31.8 - *Gas Transmission and Distribution Piping Systems*

Paragraph 831.3.2 Special Fittings. When special cast, forged, wrought, or welded fittings are required to dimensions differing from those of regular shapes specified in the applicable ASME and MSS standards, the provisions of paragraph 831.3.6 shall apply.

Paragraph 831.3.6 Pressure Design of Other Pressure-Containing Components. Pressure-containing components that are not covered by the standards listed in Mandatory Appendix A and for which design equations or procedures are not given herein may be used where the design of similarly shaped, proportioned, and sized components has been proven satisfactory by successful performance under comparable service conditions. In the absence of such service experience, the pressure design shall be based on an analysis consistent with the general design philosophy embodied in this Code and substantiated by at least one of the following:

- (a) proof tests, as described in UG-101 of Section VIII, Division 1 of the BPV Code
- (b) experimental stress analysis, as described in Annex 5.f of Section VIII, Division 2 of the BPV Code
- (c) engineering calculations

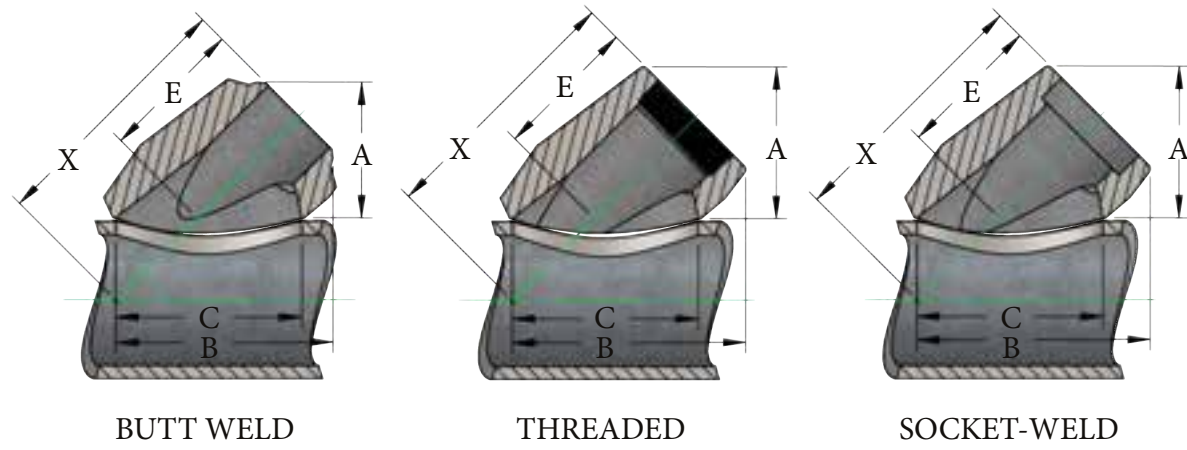
ASME B31.4 - *Pipeline Transportation Systems for Liquids and Slurries*

Paragraphs 404 and 426. Recognize and approve the use of special piping components.

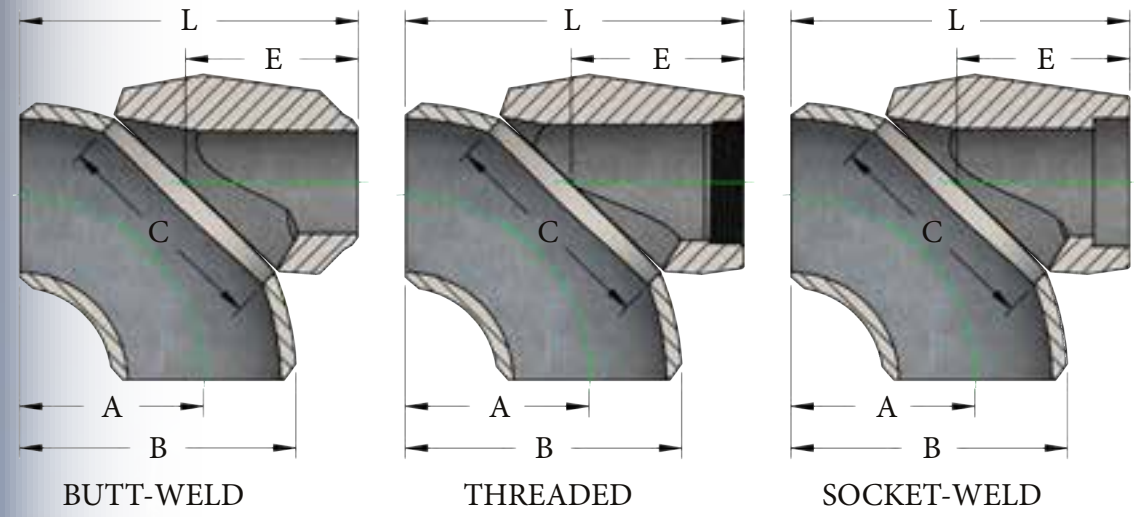
ASME B31.3 - *Process Piping*

Paragraphs 304 and 326. Recognize and approve the use of special piping components.





$$X = ((\text{RUN PIPE O.D.})/2 + \text{ROOT GAP}) / 0.707 + E$$



$$L = E + \text{SQRT}(B^2 - A^2 + \text{ROOT GAP})$$



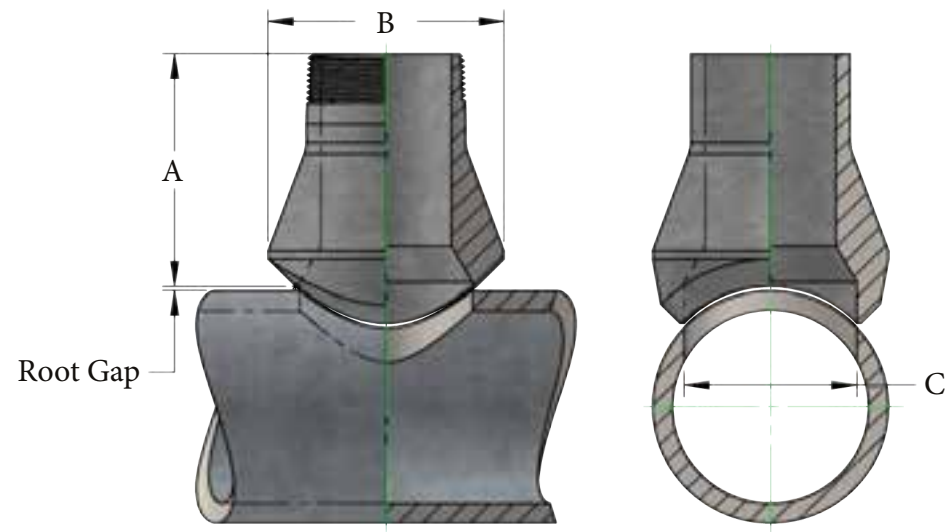
Outlet Size	DIMENSIONS							
	CLASS 3000 THREADED & SOCKET-WELD				CLASS 6000 THREADED & SOCKET-WELD			
	A	B	C	E	A	B	C	E
NPS ¼	1 9/16	2 13/32	1 7/16	1 1/16	1 9/16	2 11/32	1 7/16	1 9/16
NPS ¾	1 9/16	2 13/32	1 7/16	1 1/16	1 9/16	2 11/32	1 7/16	1 9/16
NPS ½	1 9/16	2 13/32	1 7/16	1 1/16	1 7/8	2 ¾	1 ¾	1 29/32
NPS ¾	1 7/8	2 ¾	1 ¾	1 29/32	2 3/16	3 ¼	2 ½	2 3/16
NPS 1	2 3/16	3 ¼	2 ½	2 3/16	2 ½	3 27/32	2 ¾	2 15/16
NPS 1 ¼	2 ½	3 27/32	2 ¾	2 15/16	2 ¾	4 7/32	3 ½	2 ¾
NPS 1 ½	2 ¾	4 7/32	3 ½	2 ¾	3 ¾	5 7/16	4 ½	3 5/32
NPS 2	3 ¾	5 7/16	4 ½	3 5/32	3 ¾	5 7/16	4 ½	3 5/32

Outlet Size	DIMENSIONS							
	BUTT-WELD (STD)				BUTT-WELD (XS)			
	A	B	C	E	A	B	C	E
NPS ½	1 13/32	1 15/16	1 3/16	1 ½	1 7/16	2	1 3/16	1 19/32
NPS ¾	1 ¾	2 13/32	1 ¾	1 29/32	1 17/32	2 3/16	1 9/16	1 ¾
NPS 1	2 3/32	2 7/8	1 7/8	2 9/32	1 27/32	2 ¾	1 15/16	1 31/32
NPS 1 ¼	2 9/32	3 13/32	2 9/16	2 ¾	2 ¾	3 13/32	2 ½	2 ¾
NPS 1 ½	2 19/32	3 25/32	2 13/16	2 11/16	2 9/16	3 27/32	2 13/16	2 11/16
NPS 2	3	4 9/16	3 ½	3 ½	2 31/32	4 9/16	3 ½	3 3/32
NPS 3	3 7/8	6 7/16	5 3/16	3 25/32	3 13/16	6 3/16	4 7/8	3 ¾
NPS 4	4 13/16	7 15/16	6 ¾	4 ¾	4 25/32	7 13/16	6 ¾	4 23/32
NPS 6	6 23/32	11 3/16	9 ¾	6 9/32	7 1/16	11 23/32	9 7/16	6 7/8
NPS 8	8 9/32	14 15/32	12 9/16	7 ½	9 1/16	15 3/32	12 ¼	8 ¾
NPS 10	10 3/16	18 7/32	15 ½	9 3/16	10 15/32	18 ½	15 ¾	9 11/16
NPS 12	11 23/32	20 19/32	18 ½	10 ¼	12 13/32	21 13/32	18 ¾	11 7/16
NPS 14	12 7/16	22 11/32	20 ¼	10 ¾	13 ½	22 29/32	20 ¾	11 11/16
NPS 16	14 1/32	25 19/32	23 3/16	12	14 9/32	25 9/16	23 1/16	12 7/16
NPS 18	15 15/16	28 19/32	26 ¾	13 11/16	16 ¼	29	26	14 ¼
NPS 20	17 17/32	31 ¾	29 1/16	14 15/16	17 15/16	32 1/2	28 7/8	15 ¾
NPS 24	20 7/8	37 15/16	35	17 11/16	21 13/32	38 7/16	34 13/16	18 ¾
NPS 30	25 27/32	47 1/2	43 ¾	21 11/16	-	-	-	-

Outlet Size	DIMENSIONS							
	BUTT-WELD (SCH. 160)				BUTT-WELD (XXS)			
	A	B	C	E	A	B	C	E
NPS ½	1 ¾	2 ¾	1 3/16	1 29/32	1 9/16	2 ½	1 1/16	1 7/8
NPS ¾	1 27/32	2 17/32	1 ½	2 ¾	1 11/16	2 11/32	1 ¾	1 31/32
NPS 1	2 3/32	3	1 13/16	2 15/32	2 3/32	2 7/8	1 ¾	2 ½
NPS 1 ¼	2 23/32	3 23/32	2 ¾	2 31/32	2 17/32	3 9/16	2 3/16	2 15/16
NPS 1 ½	2 31/32	4 7/32	2 7/8	3 11/32	2 27/32	4 ½	2 11/16	3 ¼
NPS 2	3 ¾	4 15/16	3 5/16	3 23/32	3 ¼	4 25/32	3 1/16	3 ¾
NPS 3	4 19/32	7 1/16	5	4 15/16	4 17/32	6 13/16	4 ¾	4 31/32
NPS 4	5 23/32	8 23/32	6 ¼	6 1/2	5 9/16	8 ½	6	6

Elbow Size	Outlet Size	DIMENSIONS				
		C	E	C	E	
CLASS 3000 - THREADED & SOCKET-WELD BUTT-WELD (STD & XS)	NPS 36 - ¾	NPS ¼	1 ½	1 19/32	1 ½	1 19/32
	NPS 36 - ¾	NPS ¾	1 ½	1 19/32	1 ½	1 19/32
	NPS 36 - ¾	NPS ½	1 ½	1 19/32	1 23/32	1 7/8
	NPS 36 - 1	NPS ¾	1 23/32	1 7/8	2 ¼	2 ¼
	NPS 36 - 2	NPS 1	2 ¼	2 ¼	2 7/8	2 ½
	NPS 36 - 2	NPS 1 ¼	2 7/8	2 ½	3 ¾	2 11/16
	NPS 36 - 2	NPS 1 ½	3 ¾	2 11/16	4 3/16	3 ¼
	NPS 36 - 3	NPS 2	4 3/16	3 ¼	-	-
	ORDER TO SPECIFIC ELBOW SIZES	NPS 2 ½	4 3/16	3 ¼	-	-
		NPS 3	5 1/16	3 7/8	-	-
NPS 4		6 ¾	4 13/16	-	-	
NPS 6		9 ¾	6 ½	-	-	
NPS 8		13 5/16	8 1/16	-	-	
NPS 10		17 1/2	10 ¾	-	-	
CLASS 6000 - THREADED & SOCKET-WELD BUTT-WELD (SCH. 160 & XXS)	NPS 2 ½	4 3/16	3 ¼	-	-	
	NPS 3	5 1/16	3 7/8	-	-	
	NPS 4	6 ¾	4 13/16	-	-	
	NPS 6	9 ¾	6 ½	-	-	
	NPS 8	13 5/16	8 1/16	-	-	
	NPS 10	17 1/2	10 ¾	-	-	

► Outlet sizes larger than NPS 2 are available as butt-weld fittings only.
 ► Outlet sizes larger than NPS 12 are available upon request.

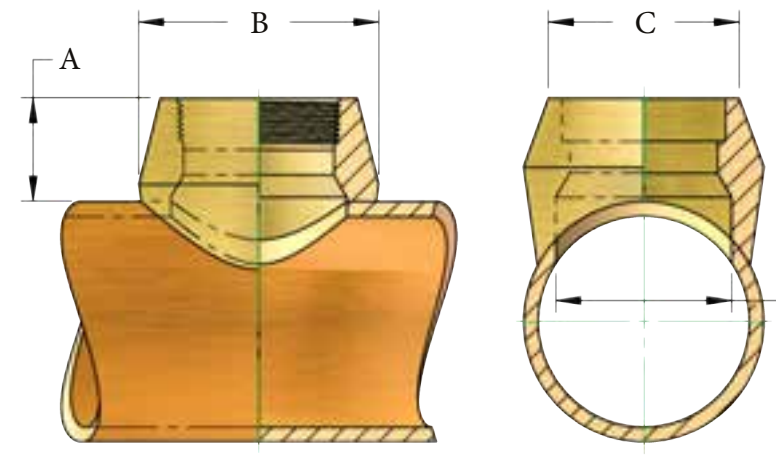


Outlet Size	Dimensions		
	A	B	C
XS	NPS 1/2	1 3/8	1 5/16
	NPS 3/4	1 3/4	1 3/16
	NPS 1	2 1/8	1 7/16
	NPS 1 1/4	2 7/16	1 3/4
	NPS 1 1/2	2 7/8	2
	NPS 2	3 1/2	2 7/16
XXS	NPS 1/2	1 3/8	9/16
	NPS 3/4	1 3/4	3/4
	NPS 1	2	1
	NPS 1 1/4	2 7/16	1 5/16
	NPS 1 1/2	2 3/4	1 1/2
	NPS 2	3 1/4	1 11/16

- ▶ Available in threaded or plain end (male socket-weld)
- ▶ Standard lengths: 3 1/2", 4 1/2", 5 1/2", and 6 1/2"
- ▶ Non standard lengths available upon request

RUN SIZE CONSOLIDATIONS - Extra Strong						
Outlet Size						
	1/2	3/4	1	1 1/4	1 1/2	2
RUN SIZES	1/2	3/4	1	1 1/4	1 1/2	2
	3/4	1	1 1/4	1 1/2	2	2 1/2
	1	1 1/2 - 1 1/4	1 1/2	2	2 1/2	3
	1 1/2 - 1 1/4	2 1/2 - 2	2	2 1/2	3	4 - 3 1/2
	2 1/2 - 2	5 - 3	2 1/2	3 1/2 - 3	4 - 3 1/2	5
	8 - 3	12 - 6	3 1/2 - 3	5 - 4	6 - 5	6
	36 - 10	36 - 14	5 - 4	8 - 6	12 - 8	10 - 8
	FLAT	FLAT	10 - 6	18 - 10	24 - 14	18 - 12
			36 - 12	36 - 20	36 - 26	36 - 20
			FLAT	FLAT	FLAT	FLAT

RUN SIZE CONSOLIDATIONS - Double Extra Strong						
Outlet Size						
	1/2	3/4	1	1 1/4	1 1/2	2
RUN SIZES	1/2	1 - 3/4	1	1 1/2 - 1 1/4	1 1/2	2
	1 1/4 - 3/4	2 - 1 1/4	2 1/2 - 1 1/4	2 1/2 - 2	2 1/2 - 2	2 1/2
	36 - 1 1/2	6 - 2 1/2	10 - 3	10 - 3	3 1/2 - 3	3 1/2 - 3
	FLAT	36 - 8	36 - 12	36 - 12	8 - 4	5 - 4
		FLAT	FLAT	FLAT	20 - 10	8 - 6
					22	18 - 10
					36 - 24	36 - 20
					FLAT	FLAT

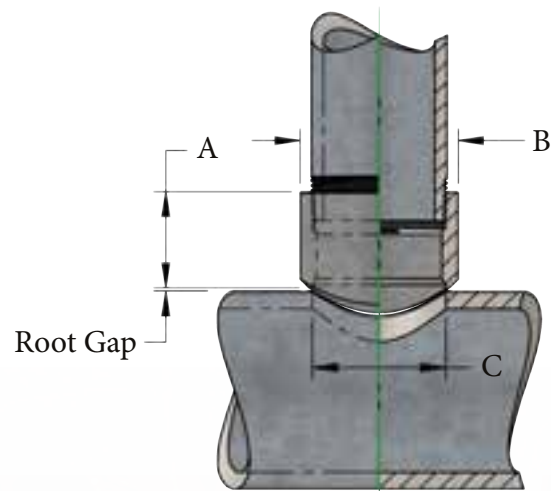


Outlet Size	Dimensions			Braze Surface	F-Min. MIL-F-1183
	A	B	C		
IPS PIPE	NPS 1/4	1 1/16	1	9/16	0.188
	NPS 3/8	1 3/16	1 1/4	3/4	0.190
	NPS 1/2	1	1 7/16	7/8	0.220
	NPS 3/4	1 1/16	1 11/16	1 1/8	0.240
	NPS 1	1 1/4	2 1/8	1 7/16	0.270
	NPS 1 1/4	1 5/16	2 1/2	1 3/4	0.300
	NPS 1 1/2	1 3/8	2 7/8	2	0.330
	NPS 2	1 1/2	3 1/2	2 7/16	0.360
	NPS 2 1/2	1 13/16	4	3	0.384
	NPS 3	2	4 13/16	3 11/16	0.442
TYPE K, L, M TUBE	NPS 1/4	1 1/16	1	9/16	0.188
	NPS 3/8	1 1/16	1	9/16	0.190
	NPS 1/2	3/4	1 1/4	3/4	0.190
	NPS 3/4	1	1 7/16	7/8	0.220
	NPS 1	1 1/16	1 11/16	1 1/8	0.240
	NPS 1 1/4	1 1/4	2 1/8	1 7/16	0.270
	NPS 1 1/2	1 5/16	2 1/2	1 3/4	0.300
	NPS 2	1 3/8	2 7/8	2	0.330
	NPS 2 1/2	1 1/2	3 1/2	2 7/16	0.360
	NPS 3	1 5/8	4 1/8	3	0.384
NPS 4	2 3/8	5 1/2	4 3/16	0.437	



COUPOLET®

THREADED
300 LBS. RATING



Outlet Size	Dimensions		
	A	B	C
NPS ½	15/16	1.188	0.758
NPS ¾	1	1.441	0.962
NPS 1	1 1/16	1.562	1.250
NPS 1 ¼	1 5/16	1.906	1.614
NPS 1 ½	1 9/16	2.188	1.843
NPS 2	1 11/16	2.750	2.323
NPS 2 ½	1 13/16	3.386	2.953
NPS 3	2 ½	4.000	3.464
NPS 4	3	5.000	4.449

► In order to eliminate "Blind Holes" cut hole prior to welding



RUN SIZE CONSOLIDATIONS - 300 lbs.									
Outlet Size									
	½	¾	1	1 ¼	1 ½	2	2 ½	3	4
	½	¾	1	1 ¼	1 ½	2	2 ½	3	5
	¾	1	1 ¼	1 ½	2	2 ½	3	3 ½	6
	1 ¼ - 1	2 - 1 ¼	2 - 1 ½	2 ½ - 2	2 ½	3	3 ½	4	8
	2 ½ - 1 ½	6 - 2 ½	4 - 2 ½	4 - 3	4 - 3	3 ½	4	5	10
	8 - 3	36 - 8	8 - 5	8 - 5	8 - 5	4	5	6	14 - 12
	36 - 10		36 - 10	36 - 10	16 - 10	5	6	8	16
					36 - 18	6	8	10	18
						8	12 - 10	12	20
						10	16 - 14	14	24
						16 - 12	36 - 18	18 - 16	36
						36 - 18		36 - 20	

GENERAL TERMS AND CONDITIONS OF SALE: BONNEY FORGE (HEREAFTER REFERRED TO AS "BF")

WARRANTY	BF expressly warrants to the Purchaser (the "Purchaser") that all BF products (each, a "Product") will be free from manufacturing defects for the one (1) year period immediately following the date of shipment (the "Warranty Period"). BF HEREBY DISCLAIMS ALL OTHER WARRANTIES WITH RESPECT TO BOTH THE PRODUCTS AND THIS AGREEMENT, INCLUDING THESE TERMS AND CONDITIONS, WHETHER EXPRESS OR IMPLIED INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND OF FITNESS FOR A PARTICULAR PURPOSE AND WARRANTIES ARISING FROM COURSE OF DEALING OR COURSE OF PERFORMANCE. The foregoing warranty shall not apply: (1) to any use of a Product in aircraft or aerospace applications ("Prohibited Applications"), (2) if a Product was not used as recommended and in accordance with approved installation and operating practices, (3) if the failure of a Product results from any cause other than a manufacturing defect, including but not limited to damage due to corrosive, abrasive or other wear normally to be expected in the use of the Product, (4) if the Product was modified or changed (unless written approval was given in advance by BF), and (5) if Purchaser fails to deliver written notice of such defect to BF during the Warranty Period.
EXCLUSIONS	Do not use BF Products in aircraft or aerospace applications. Purchaser assumes all risk of loss that arises from or relates to any use of Product in a Prohibited Application and Purchaser shall, at its own expense, indemnify, defend and hold BF harmless against all claims or losses (including legal and accounting fees) that arise from or relate to the use of any Product in a Prohibited Application.
PURCHASER'S REMEDIES	Purchaser's remedies with respect to any Product furnished by BF hereunder that is found not to be in conformity with the terms and conditions of the contract because of breach of contract, breach of express or implied warranty, or negligence shall be limited exclusively to the right of replacement of such defective Product or, at the option of BF, repayment of the sale price for the particular Product that gives rise to the claim. BF shall have no liability to Purchaser or to any other person, in tort, contract or otherwise, for claims losses, damages or injuries arising out of this purchase or use of any Product, except for the return by BF of an amount not in excess of the payments made by the Purchaser to BF for the particular Products giving rise to Purchaser's claim. No action, whether based on contract, tort or otherwise, arising out of or related to Products furnished pursuant to the Agreement may be brought by Purchaser more than one year after the cause of action has accrued and no claims for breach of warranty may be brought by Purchaser unless Purchaser notifies the BF in writing within 10 days of discovery of the breach. Any claim made after the time periods specified in the foregoing sentence shall be deemed to be null and void. UNDER NO CIRCUMSTANCES WILL BF BE LIABLE TO PURCHASER FOR DAMAGES IN EXCESS OF THE AMOUNTS PAID BY PURCHASER TO BF UNDER THE AGREEMENT OR FOR INDIRECT, INCIDENTAL, CONSEQUENTIAL, SPECIAL OR EXEMPLARY DAMAGES (EVEN IF BF HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES), SUCH AS, BUT NOT LIMITED TO, LOSS OF REVENUE OR ANTICIPATED PROFITS OR LOST BUSINESS.
PRICES	Prices, and other terms of sale and payment, are subject to change by BF without notice. Unless a contrary provision appears in this price schedule, quotation, or order acknowledgment, prices may be withdrawn without notice at any time. Stenographic or clerical errors are subject to correction.
ACCEPTANCE OF ORDERS	All orders are subject to BF credit department approval prior to acceptance by BF.
REMITTANCES	All accounts are payable in United States funds, free of exchange, collection, or any other charges. If, in the sole discretion of BF, the financial condition of the Purchaser at any time so requires, BF retains the right to require full or partial payment in advance.
PARTIAL SHIPMENTS AND PAYMENTS	BF reserves the right to make partial shipments from time to time, and to render invoices therefore which shall be due and payable as provided in said invoices and the paragraph entitled "REMITTANCES". If the Purchaser becomes overdue in any such partial payment, BF shall be entitled to suspend work and/or avail itself of other legal remedies.
TAXES	Unless otherwise specifically noted, the amount of any federal, state or local sales, use, occupancy, excise tax, or other tax of any nature, for which BF is legally liable, either intentionally or through failure of payment by Purchaser, shall be added or be in addition to the price quoted and Purchaser agrees to pay same to BF.
SHORTAGES AND DAMAGES IN TRANSIT	All claims for loss, damages, shortages, etc. must be made by Purchaser in writing within 10 days after receipt of shipment. Loss or damage to materials in transit is the responsibility of the carrier and not BF.
FREIGHT POLICY TITLE AND RISK OF LOSS	Unless otherwise specifically negotiated with the customer, BF's standard freight policy is to ship all product FCA (plant of manufacture) with BF's responsibility ceasing after delivery to the carrier. Title to and all risk of loss or damage to the Products vests in Purchaser at the time BF delivers the Products to the carrier regardless of any shipping and insurance arrangements made by BF on Purchaser's behalf. However, BF reserves and Purchaser grants, until full payment is received, a purchase money security interest in each of the Products delivered. Purchaser hereby authorizes BF to file such financing statements and deliver such notices as BF may reasonably require to perfect such purchase money security interest. BF shall have all rights and may exercise all remedies of a secured creditor under Article 9 of the Uniform Commercial Code as adopted from time to time in the Commonwealth of Pennsylvania. The remedies reserved herein shall be cumulative and in addition to any other remedies provided in law or equity. No waiver of the remedy for any breach of any provision in these terms shall constitute a waiver of any other remedy.
DELAYS	All shipping dates are good faith estimates by BF. BF makes no guarantee to ship on any date. BF shall assume no obligation to ship Products on any date and BF shall not be liable for the failure to ship Product on any date. Materials slated to be in stock are subject to prior sales.
CANCELLATIONS AND SUSPENSIONS	Purchaser may cancel this order or contract, or delay work or delivery, only upon receipt of written notification by BF from Purchaser and with BF's prior consent, and upon agreement to pay BF's adjustment charge. Orders for special products (usually "price on application items") may be changed and/or canceled only upon receipt of written instructions by BF from Purchaser and with BF's prior consent, and Purchaser shall make payment to BF for material used and work already performed.
RETURN OF MATERIAL	No Product may be returned without the prior written consent of BF. All goods returned are subject to a handling charge plus freight in both directions and charges for any required reconditioning, unless otherwise specified in writing by BF.
INDEMNITY	Purchaser shall defend, indemnify and hold BF and its affiliates harmless from any and all loss or damage sustained by BF and from and against all claims asserted against BF with respect to the Products covered hereunder arising in whole or in part out of (1) failure of Purchaser, its agents, employees, or customers to follow specifications, instructions, warnings or recommendations furnished by BF or others; (2) failure of Purchaser, its agents, employees or customers to comply with all applicable legal requirements; (3) misuse of the Products by Purchaser, its agents, employees or customers; (4) misrepresentation by Purchaser, its agents, employees or customers; (5) the full extent of the negligence of Purchaser, its agents, employees or customers; or, (6) alleged infringement of any patent, trademark, trade secret, copyright, or other intellectual property or proprietary right of Purchaser or a third party as a result of BF's performance in accordance with Purchaser's designs, plans or specifications. Purchaser hereby waives and releases BF and its affiliates from all rights of contribution or indemnity to which it may otherwise be entitled.
GOVERNING LAW	The contract shall be governed by, construed, and enforced in accordance with the laws of the Commonwealth of Pennsylvania without regard to the conflict-of-law principles of any jurisdiction. Purchaser and BF (i) agree that all actions and proceedings arising out of or relating to this Agreement shall be litigated exclusively in the state courts located in Huntingdon County, Pennsylvania and/or the United States District Court for the Middle District of Pennsylvania; (ii) consent to the jurisdiction and venue of such courts; and (iii) waive any and all rights to object to the jurisdiction and venue of such courts, to transfer or change the venue of any such action or proceeding, including but not limited to upon the basis of forum non conveniens. PURCHASER AND BF FURTHER EACH WAIVE THE RIGHT TO TRIAL BY JURY IN ANY ACTION OR PROCEEDING BASED UPON, ARISING OUT OF, OR IN ANY WAY RELATING TO, THIS AGREEMENT.
NO WAIVER	The failure of BF to exercise any of its rights under this Agreement for a breach thereof shall not be deemed to be a waiver of such rights nor shall the same be deemed to be a waiver of any subsequent breach.
DIES, TOOLS AND PATTERNS	Dies, tools and patterns used by BF to produce any Product (collectively, the "Material") shall be and remain the exclusive property of BF. Payment by Purchaser of any preparation charge with respect to such Material shall not give the Purchaser any right, title or interest in or to such Material. BF shall not be responsible for retention of dies or patterns on which no orders are received for two years or more.
FORCE MAJEURE	Neither party shall be liable to the other under this Agreement if delayed or prevented from performance by causes beyond its control including, but not limited to, fires, floods, strikes, acts of God, war, insurrection, government restrictions, or other causes of a like or different nature.
ASSIGNMENT	No assignment of the Purchaser's rights or obligations may be made without the prior, written consent of BF.
PURCHASER'S ACCEPTANCE OF BF'S TERMS	BF is not bound by any terms on the Purchaser's order form or any other document emanating from the Purchaser which attempts to impose any condition at variance with BF's terms and conditions of sale included herein or stated on BF's packages, invoices, technical data sheets or any other BF documents. BF's failure to object to provisions contained in the aforementioned forms of the Purchaser shall not be deemed a waiver of the provisions of BF's terms and conditions of sale which shall constitute the entire contract between BF and the Purchaser. No waiver, alteration, or modification of the terms and conditions of this document shall be binding unless in writing and signed by an authorized representative of BF. These BF terms and conditions constitute the entire understanding between the parties with respect to the subject matter hereof and supersede any and all prior understandings, statements, warranties, representations and agreements, oral and written, relating hereto. In the event of any discrepancy or inconsistency between these terms and conditions and any other purchase order or acceptance form used by the Purchaser in connection herewith, these BF terms and conditions shall govern, and such Purchaser purchase order, or acceptance form shall not amend, modify or add to the BF terms and conditions stated herein.
PROPRIETARY INFORMATION	Any Purchaser information provided to BF shall not be considered confidential unless otherwise agreed to by BF in a separate agreement. All drawings, works of authorship, trade secrets, inventions, improvements or other items made or developed by or for BF in connection with the performance of its obligations hereunder (the "Works") shall be BF's property. Purchaser hereby assigns all right and title in and to such Works to BF. Purchaser shall not use or disclose any of BF's trade secrets or other confidential information, whether or not designated as such, except as required in connection with the use of the Products covered hereunder.
SEVERABILITY	If any provisions of this Agreement are held to be invalid or unenforceable, such invalidity or unenforceability shall not affect the validity or enforceability of the other portions hereof, all of which provisions are hereby declared severable.
EXPORT COMPLIANCE	Bonney Forge Corporation complies with all export laws issued by the United States government, including all Export Administration Regulations (EAR) issued by the United States Department of Commerce Bureau of Industry and Security (BIS) and the Office of Foreign Assets Control (OFAC) of the United States Department of the Treasury. As such, any products quoted and/or shipped to customers must not be shipped or trans-shipped by customers to any country, individual or entity that is not permitted under and in accordance with these regulations or other laws or regulations issued by the United States government. We are not considering any Export Licenses or Technical Passports that may be required due to the material grades on this bill of material. In the event of an order we can then proceed with any fees and delivery increases that may occur with this inquiry.

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