



Product Catalog

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Our Legacy, Our Future

F&G Industries stands as a symbol of excellence in forged fittings and flanges - built on over five decades of experience, innovation, and family dedication. Our journey began in 1967 with a focus on machining forged components, and over three generations, we've grown into a global manufacturing leader headquartered in Houston, Texas.

As a family-owned company, we merge traditional craftsmanship with cutting-edge technology. With in-house forging, CNC machining, heat treatment, and hot dip galvanization, we maintain full control over production - delivering precision, consistency, and performance in every product.

Today, F&G Industries is proud to serve the oil & gas and industrial sectors with fittings and flanges that meet the highest standards for quality and reliability.

Every Forge, Every Finish

We don't just manufacture fittings; we craft performance through every stage of production. With a true end-to-end manufacturing approach, we maintain complete control from raw material to final inspection. This ensures exceptional consistency, precision, and reliability in every fitting we ship out.

By combining expert craftsmanship with advanced technology, we deliver products that meet the highest standards of quality. They are built to perform in the most demanding environments and backed by decades of experience.

On Time, Every Time

Our customers operate in industries where every second counts. That's why F&G Industries guarantees exceptional lead times and seamless delivery. By managing every production step, we ensure your project stays on schedule, every time.

Reliability, Redefined

F&G Industries is redefining what reliability means in forged fittings. Engineered to exceed ISO and CE/PED standards, our fittings deliver enduring strength and performance, even in the most demanding environments. Quality isn't just a promise; it's our standard.

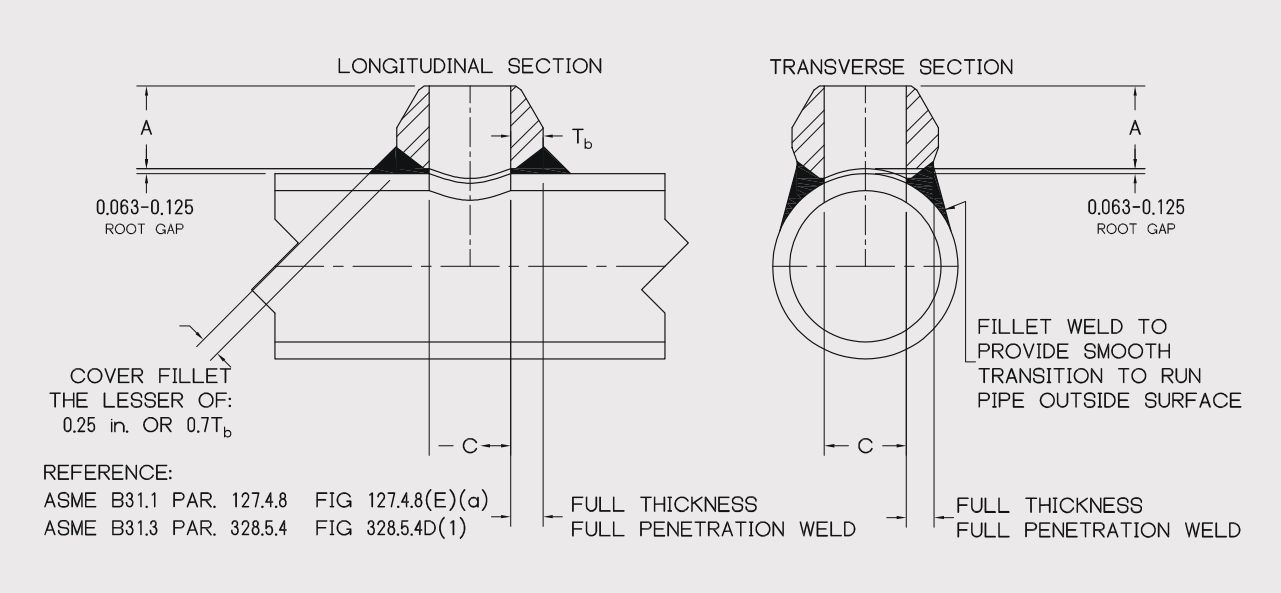
Comprehensive Product Line

- **ASME B16.11** Fittings
 - Size 1/8" - 4".
 - Class 2000, 3000, 6000 for threaded.
 - Class 3000, 6000, 9000 for socket welded.
- **MSS SP-83** Unions
 - Size 1/8" - 3".
 - Class 3000, 600 for threaded and socket welded.
- **MSS SP-95** Swage Nipples & Bull Plugs
 - Size 1/8" - 4".
 - Class STD, XS, SCH160, XXS.
- **MSS SP-97** Outlets
 - Size 1/8" - 4".
 - Class STD, XS, SCH160, XXS for butt welding.
 - Class 3000, 6000, 9000 for threaded and socket welded.



BUTT WELD OUTLET

SIZE : 1/8 -36 IDENTIFICATION : STANDARD, X-STG, SCH.160, XX-STG
MATERIAL : ALL ASTM / ASME MATERIAL GRADES
PRODUCT CONFORMITY : MSS SP-97, ASME B16.25, ASME B31.1, ASME B31.3



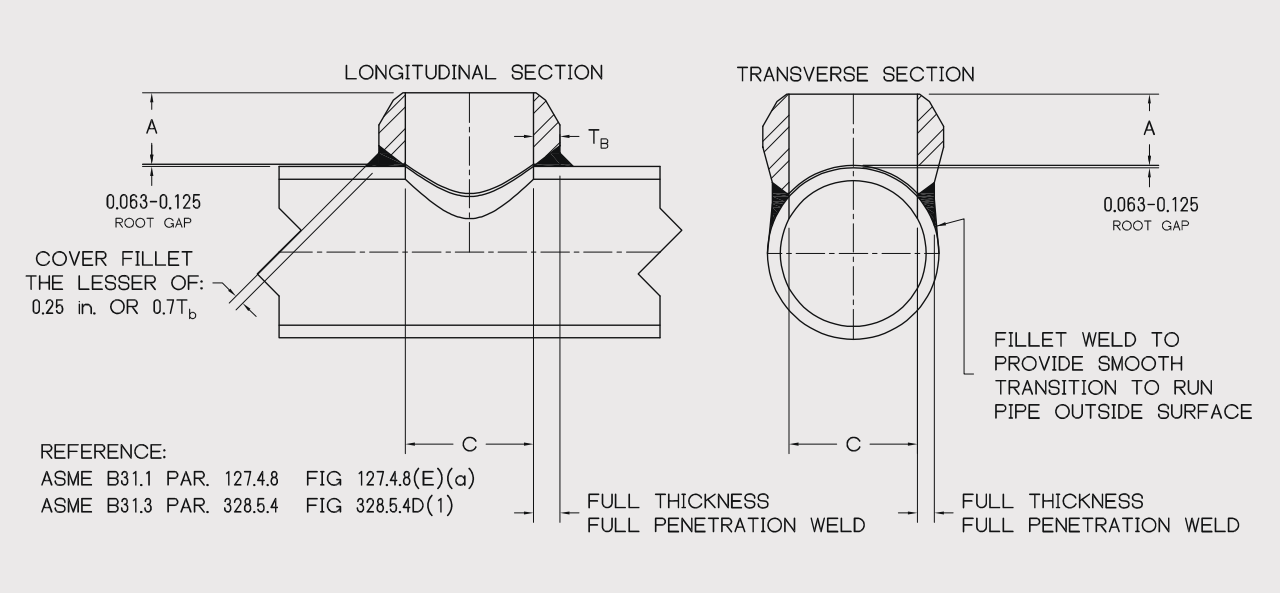
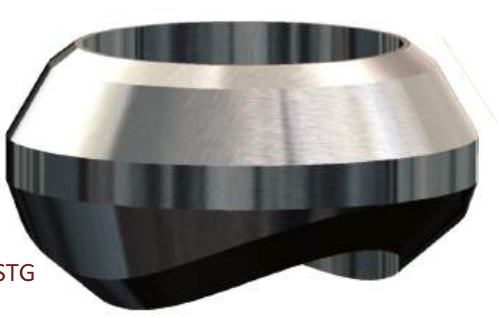
SIZES												
NPS	STANDARD			X-STG			SCH160			XX-STG		
	A	C	WT	A	C	WT	A	C	WT	A	C	WT
1/8	5/8	0.625	0.05	5/8	0.625	0.05	-	-	-	-	-	-
1/4	5/8	0.625	0.05	5/8	0.625	0.05	-	-	-	-	-	-
3/8	3/4	0.493	0.05	3/4	0.423	0.05	-	-	-	-	-	-
1/2	3/4	0.622	0.05	3/4	0.742	0.05	1-1/8	0.563	0.11	1-1/8	0.563	0.11
3/4	7/8	0.824	0.10	7/8	0.742	0.08	1-1/4	0.750	0.32	1-1/4	0.750	0.32
1	1-1/16	1.062	0.15	1-1/16	1.062	0.16	1-1/2	1.000	0.39	1-1/2	1.000	0.39
1-1/4	1-1/4	1.380	0.29	1-1/4	1.278	0.25	1-3/4	1.313	0.57	1-3/4	1.313	0.57
1-1/2	1-5/16	1.625	0.35	1-5/16	1.625	0.31	2	1.500	0.79	2	1.500	0.79
2	1-1/2	2.313	0.52	1-1/2	2.313	0.56	2-3/16	1.688	0.98	2-3/16	1.688	0.98
2-1/2	1-5/8	2.500	0.88	1-5/8	2.500	1.02	2-7/16	2.125	1.54	2-7/16	2.125	1.54
3	1-3/4	3.125	1.18	1-3/4	3.125	1.29	2-7/8	2.875	2.86	2-7/8	2.875	2.86
4	2	4.145	1.87	2	4.145	2.07	3-5/16	3.875	4.76	3-5/16	3.875	4.76

NOTES : 1. LARGER SIZES AND SPECIAL DIMENSIONS AVAILABLE
2. T_b AVAILABLE UPON REQUEST
3. WEIGHTS BASED ON CARBON STEEL



BUTT WELD OUTLET

SIZE : 1/8 -36 IDENTIFICATION : STANDARD, X-STG, SCH.160, XX-STG
MATERIAL : ALL ASTM / ASME MATERIAL GRADES
PRODUCT CONFORMITY : MSS SP-97, ASME B16.25, ASME B31.1, ASME B31.3



SIZES												
NPS	STANDARD			X-STG			SCH160			XX-STG		
	A	C	WT	A	C	WT	A	C	WT	A	C	WT
6	2-3/8	6.112	4.99	3-1/16	5.800	6.80	-	-	-	-	-	-
8	2-3/4	8.688	12.70	3-7/8	8.688	14.51	-	-	-	-	-	-
10	3-1/16	10.813	17.69	3-1/2	10.738	20.87	-	-	-	-	-	-
12	3-3/8	12.813	29.48	3-15/16	13.000	27.67	-	-	-	-	-	-
14	3-1/2	14.063	31.75	4-1/8	14.313	34.02	-	-	-	-	-	-
16	3-11/16	16.063	41.73	4-7/16	16.500	52.06	-	-	-	-	-	-
18	4-1/16	18.625	56.70	4-11/16	18.625	58.97	-	-	-	-	-	-
20	4-5/8	20.063	79.38	5	20.813	84.82	-	-	-	-	-	-
24	5-3/8	25.125	127.01	5-1/2	25.125	143.34	-	-	-	-	-	-

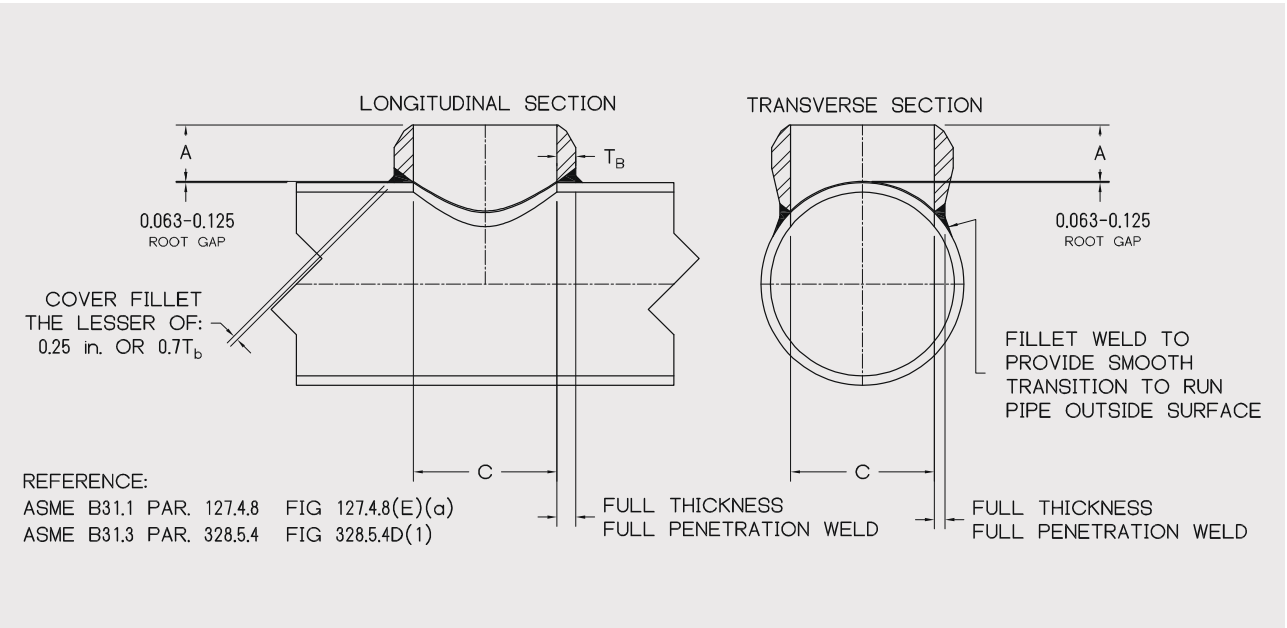
NOTES : 1. LARGER SIZES AND SPECIAL DIMENSIONS AVAILABLE
2. FOR FULL SIZE NPS 3 1/2, A = 2"
3. T_b AVAILABLE UPON REQUEST
4. WEIGHTS BASED ON CARBON STEEL



BUTT WELD OUTLET



SIZE : 1/8 - 36 **IDENTIFICATION :** STANDARD, X-STG, SCH.160, XX-STG
MATERIAL : ALL ASTM / ASME MATERIAL GRADES
PRODUCT CONFORMITY : MSS SP-97, ASME B16.25, ASME B31.1, ASME B31.3



RUN SIZES												
Buttweld Standard	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	6
	1/4	3/8-	1/2-1	3/4-2	1	1-1/4	1-1/2	2	2-1/2	3	4	6
	3/8-36	3/4-36	1-1/4-36	2-1/2-36	1-1/4-1-	1-1/2-2	2-3-1/2	2-1/2-	3-4	3-1/2-	5-6	8
	-	-	-	-	2-36	2-1/2-6	4-36	3-1/2-	5-10	5-6	8-10	10
	-	-	-	-	-	8-36	-	8-36	12-36	8-14	12-20	12-14
	-	-	-	-	-	-	-	-	-	16-36	22-36	16-18
	-	-	-	-	-	-	-	-	-	-	-	20-24
	-	-	-	-	-	-	-	-	-	-	-	26-34
Buttweld Extra Strong	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	6
	1/4-36	3/8	1/2-3/4	3/4-1-1/2	1	1-1/4-2	1-1/2	2	2-1/2	3	4	6
	-	1/2-36	1-36	2-36	1-1/4-1-	2-1/2-5	2-3-1/2	2-1/2-	3-4	3-1/2-	5-6	8
	-	-	-	-	2-36	6-36	4-36	3-1/2-	5-10	5-6	8-10	10
	-	-	-	-	-	-	-	8-36	12-36	8-14	12-20	12-14
	-	-	-	-	-	-	-	-	-	1-36	22-36	16-18
	-	-	-	-	-	-	-	-	-	-	-	20-24
	-	-	-	-	-	-	-	-	-	-	-	26-34
	-	-	-	-	-	-	-	-	-	-	-	36-42

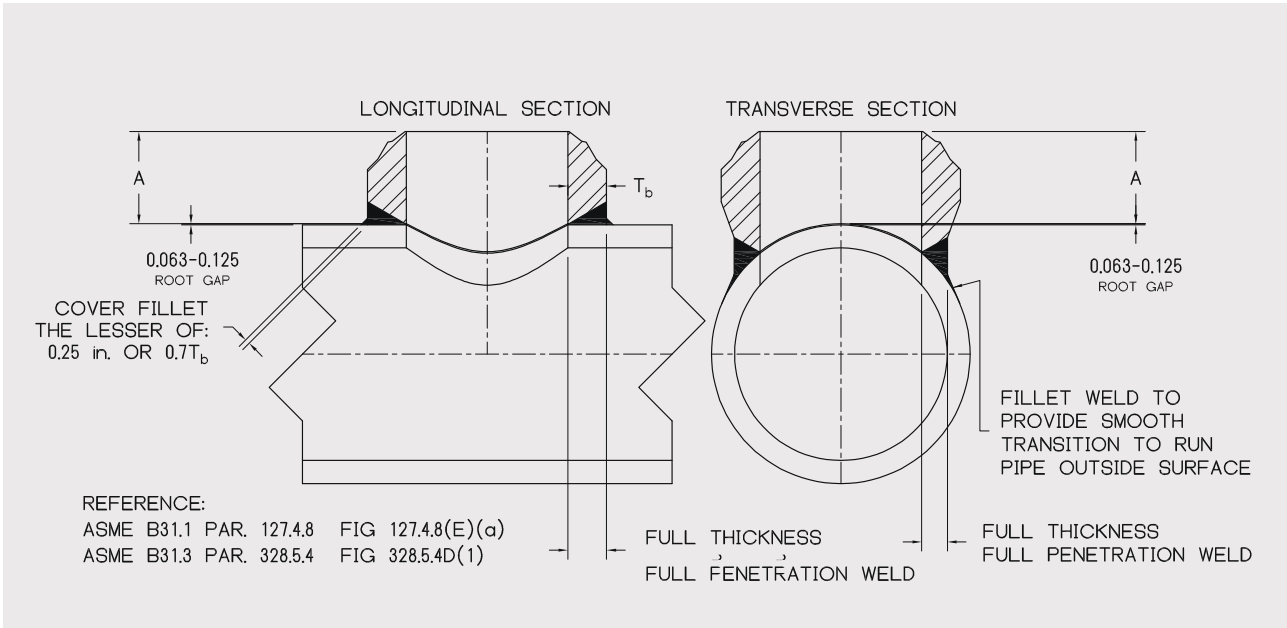
NOTES : 1. LARGER SIZES AND SPECIAL DIMENSIONS AVAILABLE
3. FOR FULL SIZE NPS 12 X-STG, A = 3 15/16
5. FOR FULL SIZE NPS 16 X-STG, A = 4 7/16
7. FOR FULL SIZE NPS 20 STD A = 4 5/8 / X-STG A = 5
2. FOR FULL SIZE NPS 10 X-STG, A = 3 1/2
4. FOR FULL SIZE NPS 14 X-STG, A = 4 1/8
6. FOR FULL SIZE NPS 18 STD A = 4 1/16 / X-STG A = 4 11/16
8. FOR FULL SIZE NPS 24 STD, A = 5 3/8



HEAVY WALL BUTT WELD OUTLET



SIZE : 3 - 24 **IDENTIFICATION :** GREATER THAN X-STG
MATERIAL : ALL ASTM / ASME MATERIAL GRADES
PRODUCT CONFORMITY : MSS SP-97, ASME B16.25, ASME B31.1, ASME B31.3



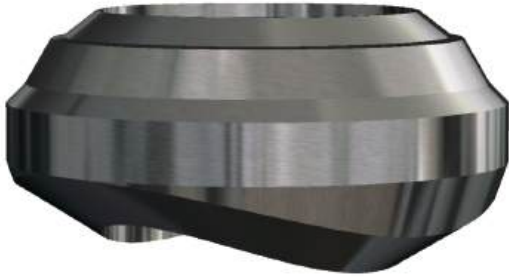
"A" DIMENSIONS BASED ON HEADER WALL THICKNESS										
NPS	3/4	1	1 1/4	1 1/2	1 3/4	2	2 1/4	2 1/2	2 3/4	3
3	2 7/8	3 1/4	3 3/8	3 5/8	4 1/8	4 9/16	5	5 1/2	5 7/8	6 1/16
3 1/2	3 1/8	3 1/4	3 7/16	3 3/4	4 3/16	4 5/8	5 1/16	5 9/16	6	6 5/16
4	3 5/16	3 3/8	3 1/2	3 7/8	4 5/16	4 3/4	5 3/16	5 5/8	6 1/8	6 9/16
5	3 3/4	3 3/4	4	4 1/4	4 3/4	5 1/4	5 3/4	6 1/4	6 5/8	7 3/16
6	4 1/8	4 3/8	4 1/2	4 11/16	5 1/4	5 3/4	6 1/4	6 3/4	7 1/4	7 13/16
8	4 3/16	4 5/8	4 7/8	5 3/16	5 3/4	6 3/8	6 15/16	7 1/2	8 1/8	8 11/16
10	4 1/4	4 7/8	5	5 5/16	5 15/16	6 9/16	7 3/16	7 13/16	8 7/16	9 1/16
12	4 3/8	5 1/8	5 3/8	5 11/16	6 5/16	6 15/16	7 9/16	8 3/16	8 13/16	9 7/16
14	4 1/2	5 1/4	5 1/2	5 13/16	6 5/16	6 15/16	7 9/16	8 3/16	8 13/16	9 7/16
16	4 11/16	5 7/8	6	6 7/16	6 5/8	7 1/4	7 7/8	8 1/2	9 1/8	9 3/4
18	5 1/8	6 1/2	6 1/2	6 1/2	6 13/16	7 7/16	8 1/4	8 13/16	9 7/16	10 1/16
20	5 5/8	6 3/4	7	7 9/16	7 13/16	8 1/8	8 11/16	9 1/4	9 15/16	10 3/8
24	6 1/2	7 5/8	8	8 3/4	9	9 13/16	10 1/2	11	12 9/16	10 11/16

THE CORRECT WAY TO READ THE HEAVY WALL CHART IS AS FOLLOWS, USING THE EXAMPLE 24 1.625 NW X 12 SCH.80 BUTT-WELD OUTLET. THE RUN PIPE WALL THICKNESS IS GREATER THAN 1.500" AND LESS THAN 1.750", THEREFORE, USE THE "A" DIMENSION FOR THE 12" BRANCH SIZE UNDER THE 1 3/4" RUN WALL THICKNESS COLUMN. THE "A" DIMENSION FOR THIS BWB IS 6 5/16".

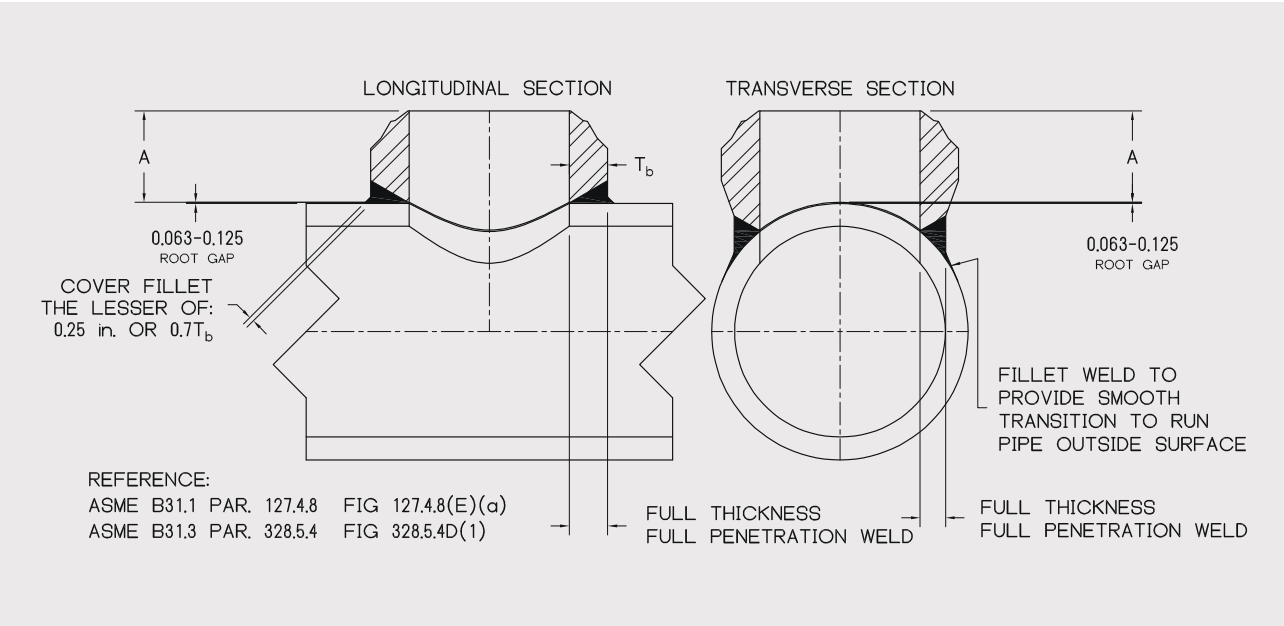
NOTES: 1. LARGER SIZES AND SPECIAL DIMENSIONS AVAILABLE



HEAVY WALL BUTT WELD OUTLET



SIZE : 3 - 24 IDENTIFICATION : GREATER THAN X-STG
MATERIAL : ALL ASTM / ASME MATERIAL GRADES
PRODUCT CONFORMITY : MSS SP-97, ASME B16.25, ASME B31.1, ASME B31.3



"A" DIMENSIONS BASED ON HEADER WALL THICKNESS										
NPS	3/4	1	1 1/4	1 1/2	1 3/4	2	2 1/4	2 1/2	2 3/4	3
3	2 7/8	3 1/4	3 3/8	3 5/8	4 1/8	4 9/16	5	5 1/2	5 7/8	6 1/16
3 1/2	3 1/8	3 1/4	3 7/16	3 3/4	4 3/16	4 5/8	5 1/16	5 9/16	6	6 5/16
4	3 5/16	3 3/8	3 1/2	3 7/8	4 5/16	4 3/4	5 3/16	5 5/8	6 1/8	6 9/16
5	3 3/4	3 3/4	4	4 1/4	4 3/4	5 1/4	5 3/4	6 1/4	6 5/8	7 3/16
6	4 1/8	4 3/8	4 1/2	4 11/16	5 1/4	5 3/4	6 1/4	6 3/4	7 1/4	7 13/16
8	4 3/16	4 5/8	4 7/8	5 3/16	5 3/4	6 3/8	6 15/16	7 1/2	8 1/8	8 11/16
10	4 1/4	4 7/8	5	5 5/16	5 15/16	6 9/16	7 3/16	7 13/16	8 7/16	9 1/16
12	4 3/8	5 1/8	5 3/8	5 11/16	6 5/16	6 15/16	7 9/16	8 3/16	8 13/16	9 7/16
14	4 1/2	5 1/4	5 1/2	5 13/16	6 5/16	6 15/16	7 9/16	8 3/16	8 13/16	9 7/16
16	4 11/16	5 7/8	6	6 7/16	6 5/8	7 1/4	7 7/8	8 1/2	9 1/8	9 3/4
18	5 1/8	6 1/2	6 1/2	6 1/2	6 13/16	7 7/16	8 1/4	8 13/16	9 7/16	10 1/16
20	5 5/8	6 3/4	7	7 9/16	7 13/16	8 1/8	8 11/16	9 1/4	9 15/16	10 3/8
24	6 1/2	7 5/8	8	8 3/4	9	9 13/16	10 1/2	11	12 9/16	10 11/16

THE CORRECT WAY TO READ THE HEAVY WALL CHART IS AS FOLLOWS, USING THE EXAMPLE 24 1.625 NW X 12 SCH.80 BUTT-WELD OUTLET. THE RUN PIPE WALL THICKNESS IS GREATER THAN 1.500" AND LESS THAN 1.750", THEREFORE, USE THE "A" DIMENSION FOR THE 12" BRANCH SIZE UNDER THE 1 3/4" RUN WALL THICKNESS COLUMN. THE "A" DIMENSION FOR THIS BWB IS 6 5/16".

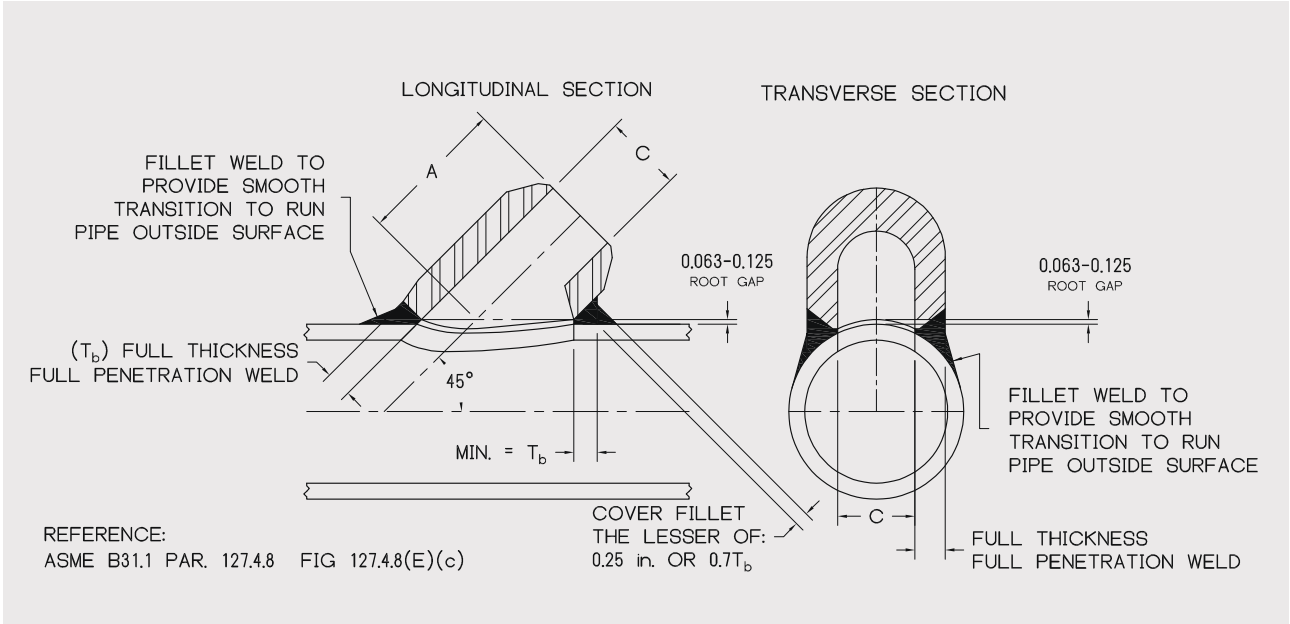
NOTES: 1. LARGER SIZES AND SPECIAL DIMENSIONS AVAILABLE



BUTT WELD LATERAL OUTLET



SIZE : 1/4 - 2 IDENTIFICATION : STANDARD, X-STG, SCH.160, XX-STG
MATERIAL : ALL ASTM / ASME MATERIAL GRADES
PRODUCT CONFORMITY : MSS SP-97, ASME B16.25, ASME B31.1, ASME B31.3



DIMENSIONS AND CONSOLIDATIONS												
NPS	STANDARD			X-STG			SCH.160			XX-STG		
	A	C	CONSOLIDATION	A	C	CONSOLIDATION	A	C	CONSOLIDATION	A	C	CONSOLIDATION
1/4	1 9/16	0.364	36 - 1/4	1 9/16	0.302	36 - 1/4						
3/8	1 9/16	0.493	36 - 3/8	1 9/16	0.423	36 - 3/8						
1/2	1 9/16	0.622	1/2 36 - 3/4	1 9/16	0.546	1/2 36 - 3/4	1 3/4	0.464	36 - 1/2	1 3/4	0.252	36 - 1/2
3/4	1 13/16	0.824	1 - 3/4 36 - 1 1/4	1 13/16	0.742	3/4 36 - 1	1 15/16	0.612	36 - 3/4	1 15/16	0.434	36 - 3/4
1	2 3/16	1.049	1 1 1/2 - 1 1/4 36 - 2	2 3/16	0.957	1 1/2 - 1 36 - 2	2 3/8	0.815	1 36 - 1 1/4	2 3/8	0.599	36 - 1
1 1/4	2 3/16	1.380	1 1/2 - 1 1/4 3 - 2 36 - 3 1/2	2 3/16	1.278	1 1/4 2 1/2 - 1 1/2 36 - 3	2 7/8	1.160	2 - 1 1/4 36 - 2 1/2	2 7/8	0.896	1 1/4 36 - 1 1/2
1 1/2	2 9/16	1.610	2 - 1 1/2 4 - 2 1/2 36 - 5	2 9/16	1.500	2 - 1 1/2 4 - 2 1/2 36 - 5	3 1/4	1.338	1 1/2 3 - 2 36 - 3 1/2	3 1/4	1.100	2 - 1 1/2 36 - 2 1/2
2	2 13/16	2.067	2 2 1/2 3 1/2 - 3 6 - 4 36 - 8	2 13/16	1.939	2 3 - 2 1/2 6 - 3 1/2 36 - 8	3 11/16	1.687	2 1/2 - 2 5 - 3 36 - 6	3 11/16	1.503	2 4 - 2 1/2 36 - 5

NOTES : 1. LARGER SIZES AND SPECIAL DIMENSIONS AVAILABLE

2. T_b AVAILABLE UPON REQUEST



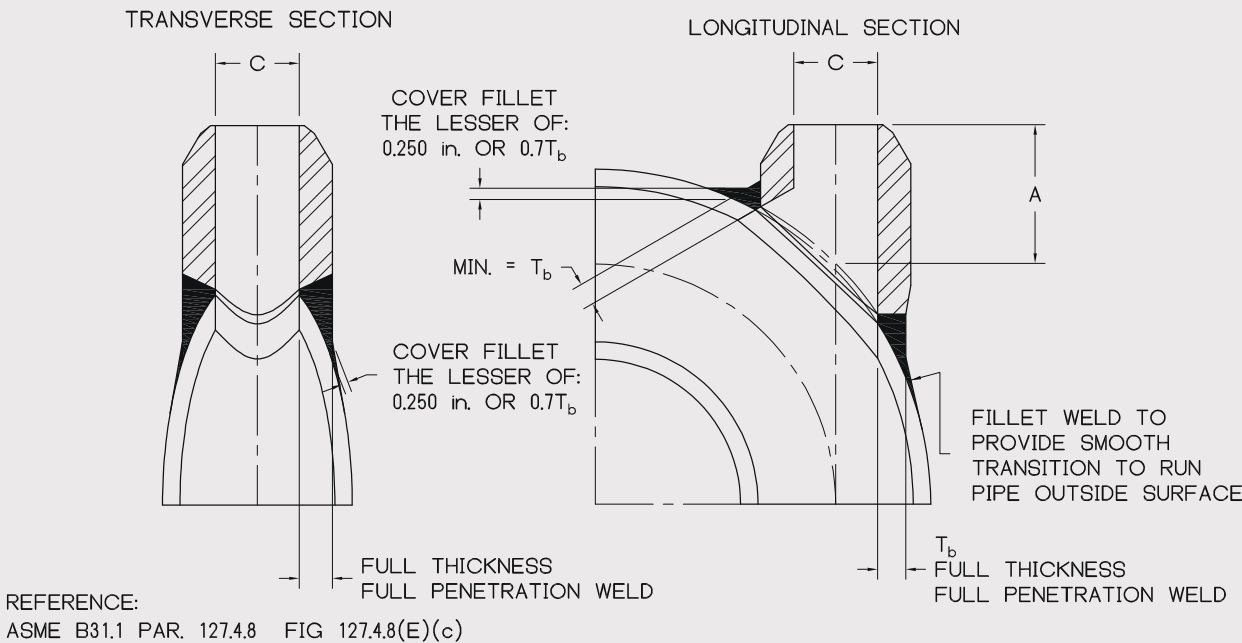
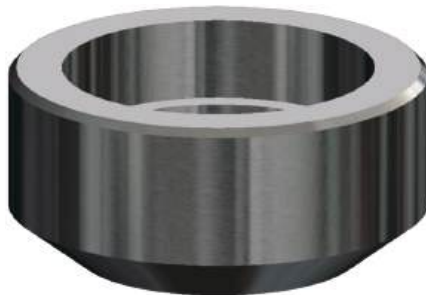
BUTT WELD ELBOW OUTLET

SIZE : 1/4 - 2 IDENTIFICATION : STANDARD, X-STG, SCH.160, XX-STG
MATERIAL : ALL ASTM / ASME MATERIAL GRADES
PRODUCT CONFORMITY : MSS SP-97, ASME B16.25, ASME B31.1, ASME B31.3



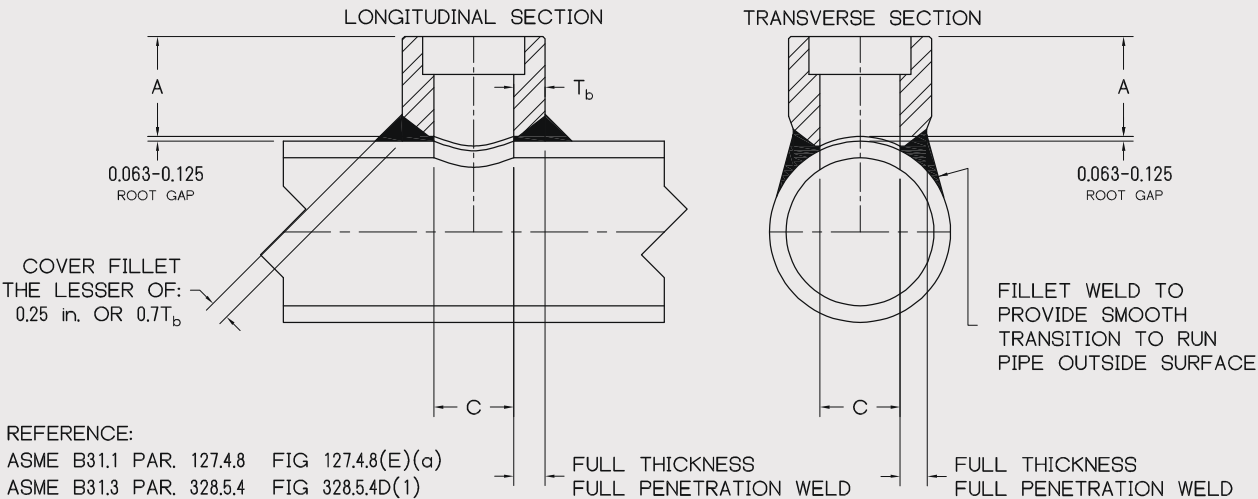
SOCKET WELD OUTLET

SIZE : 1/8 - 4 CLASS : 3000, 6000
MATERIAL : ALL ASTM / ASME MATERIAL GRADES
PRODUCT CONFORMITY : MSS SP-97, ASME B16.11, ASME B31.1, ASME B31.3



COVER FILLET NOTE: The minimum cover weld throat thickness applies when the angle between the branch fitting groove weld face and the run pipe surface is less than 135 deg. For areas where the angle between the groove weld face and the run pipe surface is 135 deg or greater, the cover weld may transition to nothing. Cover fillet shall provide a smooth transition to run pipe.

DIMENSIONS AND CONSOLIDATIONS												
NPS	STANDARD			X-STG			SCH.160			XX-STG		
	A	C	CONSOLIDATION	A	C	CONSOLIDATION	A	C	CONSOLIDATION	A	C	CONSOLIDATION
1/2	1 3/16	0.622	36 - 3/4	1 3/16	0.546	36 - 3/4	1 9/16	0.464	36 - 3/4	1 9/16	0.252	36 - 3/4
3/4	1 3/8	0.824	36 - 1	1 3/8	0.742	36 - 1	1 3/4	0.612	36 - 1	1 3/4	0.434	36 - 1
1	1 11/16	1.049	36 - 2	1 11/16	0.957	36 - 2	2 1/8	0.815	36 - 2	2 1/8	0.599	36 - 2
1 1/4	2 1/16	1.380	36 - 2	2 1/16	1.278	36 - 2	2 9/16	1.160	36 - 2	2 9/16	0.896	36 - 2
1 1/2	2 1/4	1.610	36 - 2	2 1/4	1.500	36 - 2	3	1.338	36 - 2	3	1.100	36 - 2
2	2 5/8	2.067	36 - 3	2 5/8	1.939	36 - 3	3 5/16	1.687	36 - 3	3 5/16	1.503	36 - 3



SIZES						
NPS	Class 3000			Class 6000		
	A	C	WT	A	C	WT
1/8	3/4	0.625	0.05	-	-	-
1/4	3/4	0.437	0.06	-	-	-
3/8	13/16	0.578	0.06	-	-	-
1/2	1	0.718	0.13	1-1/4	0.718	0.13
3/4	1-1/16	0.922	0.18	1-7/16	0.922	0.18
1	1-5/16	1.156	0.33	1-9/16	1.156	0.33
1-1/4	1-5/16	1.500	0.44	1-5/8	1.500	0.44
1-1/2	1-3/8	1.734	0.51	1-11/16	1.734	0.51
2	1-1/2	2.218	0.75	2-1/16	2.218	0.75
2-1/2	1-13/16	2.625	1.24	-	-	-
3	2	3.250	1.76	-	-	-
4	2-1/4	4.250	2.80	-	-	-

NOTES : 1. LARGER SIZES AND SPECIAL DIMENSIONS AVAILABLE

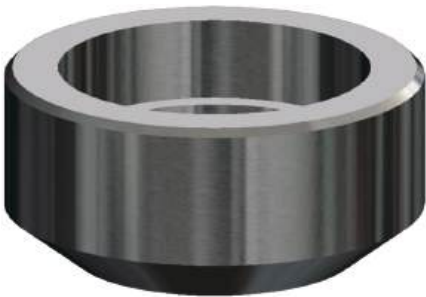
2. T_b AVAILABLE UPON REQUEST

NOTES : 1. LARGER SIZES AND SPECIAL DIMENSIONS AVAILABLE
3. T_b AVAILABLE UPON REQUEST

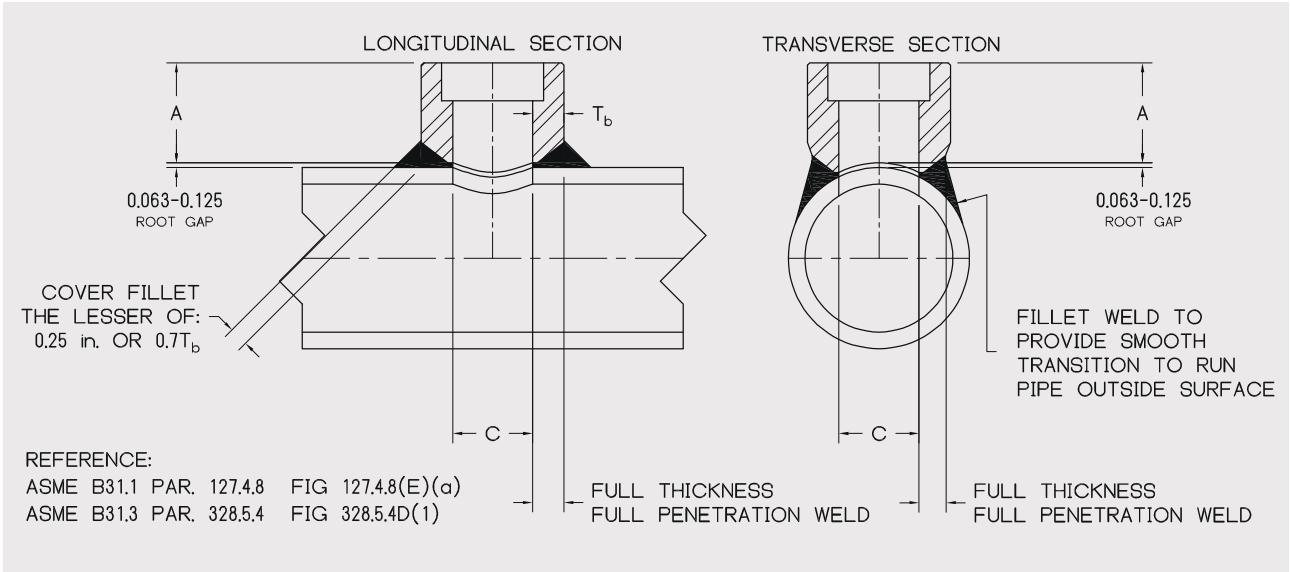
2. TYPICAL SOCKET DEPTH TOLERANCE: +.063 / - .000
4. WEIGHTS BASED ON CARBON STEEL



SOCKET WELD OUTLET



SIZE : 1/8 - 4 CLASS : 3000, 6000
MATERIAL : ALL ASTM / ASME MATERIAL GRADES
PRODUCT CONFORMITY : MSS SP-97, ASME B16.11, ASME B31.1, ASME B31.3



RUN SIZES											
Socket-Weld Class 3000	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
	1-4	3/8-1/2	1/2	3/4-1-1/4	1	1-1/4-1-1/2	1-1-2	2	2-1/2	3	4
	3/8-36	3/4-36	3/4-36	1-1/2-36	1-1/4-2-1/2	2-3-1/2	2-2-1/2	2-1/2-3-1/2	3-3-1/2	5-3-1/2	5-6
	-	-	-	-	3-36	4-36	3-5	4-6	4-6	6-14	8-10
	-	-	-	-	-	-	6-36	8-36	8-36	16-36	12-20
	-	-	-	-	-	-	-	-	-	-	22-36
Socket-Weld Class 6000	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
	1/4-36	3/8-36	1/2	3/4-1	1	1-1/4	1-1-2	2	2-1/2-3	3-3-1/2	4
	-	-	3/4-36	1-1/4-36	1-1/4-2-1/2	1-1/2-4	2-2-1/2	2-1/2-3-1/2	3-1/2-5	4-5	5
	-	-	-	-	3-36	5-36	3-5	4-6	6-18	6-10	6-8
	-	-	-	-	-	-	6-36	8-36	20-36	12-26	10-14
	-	-	-	-	-	-	-	-	-	28-36	16-36

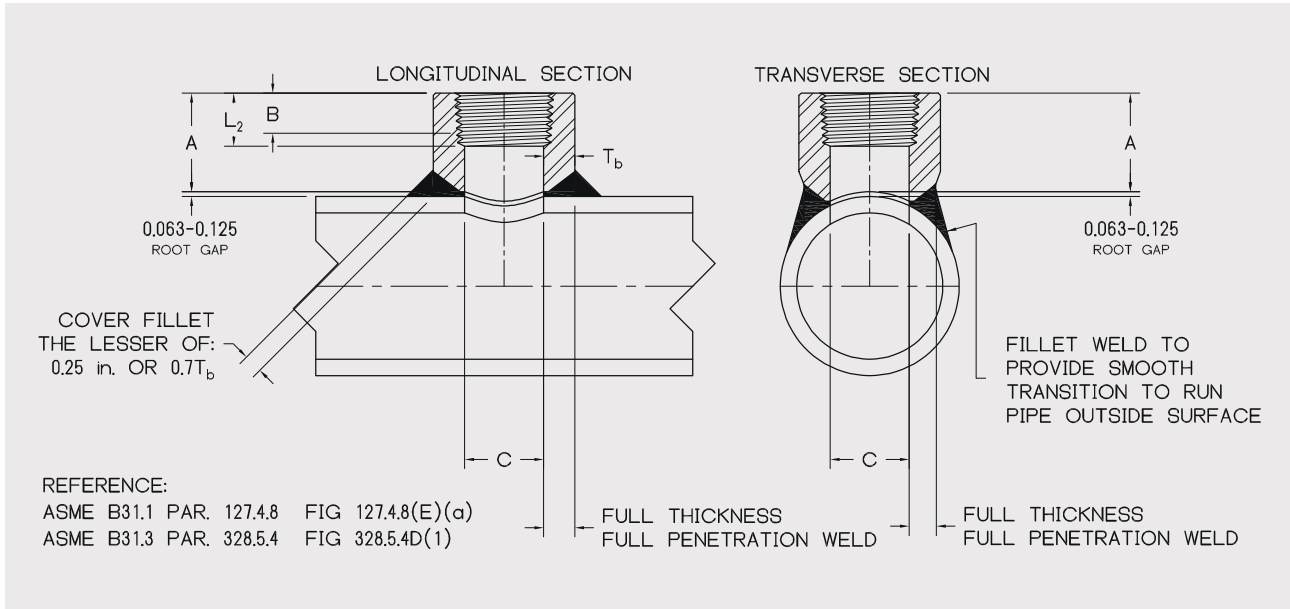
NOTES : 1. LARGER SIZES AND SPECIAL DIMENSIONS AVAILABLE
2. TYPICAL SOCKET DEPTH TOLERANCE: +.063 / - .000
3. T_b AVAILABLE UPON REQUEST
4. WEIGHTS BASED ON CARBON STEEL



THREADED OUTLET



SIZE : 1/8 - 4 CLASS : 3000, 6000
MATERIAL : ALL ASTM / ASME MATERIAL GRADES
PRODUCT CONFORMITY : MSS SP-97, ASME B16.11, ASME B1.20.1 (NPT), ASME B31.1, ASME B31.3



SIZES						
NPS	Class 3000			Class 6000		
	A	C	WT	A	C	WT
1/8	3/4	0.625	0.05	-	-	-
1/4	3/4	0.364	0.06	-	-	-
3/8	13/16	0.493	0.06	-	-	-
1/2	1	0.622	0.13	1-1/4	0.464	0.13
3/4	1-1/16	0.824	0.18	1-7/16	0.612	0.18
1	1-5/16	1.049	0.33	1-9/16	0.815	0.33
1-1/4	1-5/16	1.380	0.44	1-5/8	1.160	0.44
1-1/2	1-3/8	1.610	0.51	1-11/16	1.338	0.74
2	1-1/2	2.067	0.75	2-1/16	1.687	0.75
2-1/2	1-13/16	2.469	1.24	-	-	-
3	2	3.068	1.76	-	-	-
4	2-1/4	4.026	2.99	-	-	-

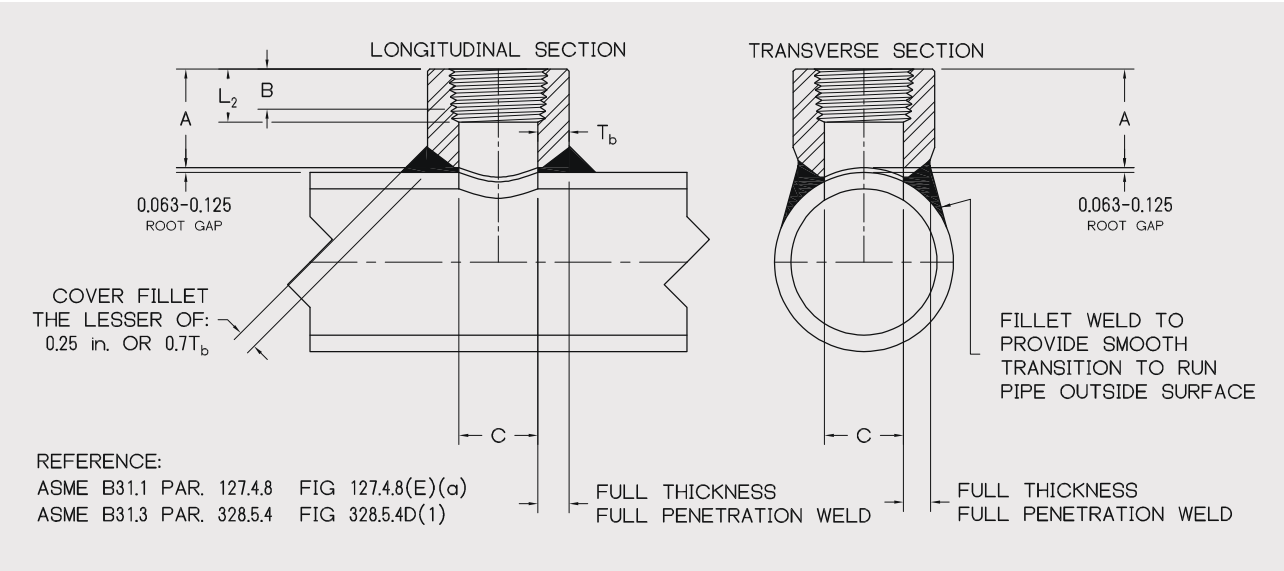
NOTES : 1. LARGER SIZES, SPECIAL DIMENSIONS AND SPECIAL THREADS AVAILABLE
2. DIMENSION B IS MINIMUM OF PERFECT THREAD. THE LENGTH OF USEFUL THREAD (B PLUS THREADS WITH FULLY FORMED ROOTS AND FLAT CRESTS) SHALL NOT BE LESS THAN L₂ (EFFECTIVE LENGTH OF EXTERNAL THREADED) PER ASME B1.20.1
3. T_b AVAILABLE UPON REQUEST
4. WEIGHTS BASED ON CARBON STEEL



THREADED OUTLET



SIZE : 1/8 - 4 CLASS : 3000, 6000
MATERIAL : ALL ASTM / ASME MATERIAL GRADES
PRODUCT CONFORMITY : MSS SP-97, ASME B16.11, ASME B1.20.1 (NPT), ASME B31.1, ASME B31.3

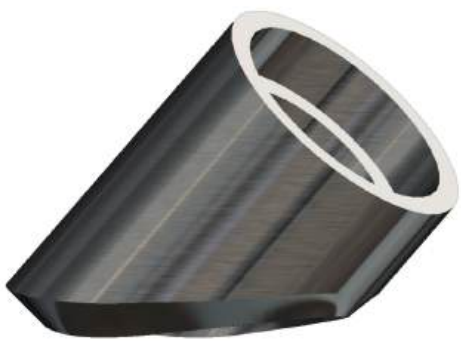


RUN SIZES												
Threaded Class 3000	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	-
	1/4-3/8	3/8-1	1/2	3/4-1-1/4	1	1-1/4-1-1/2	1-1/2	2	2-1/2	3	4	-
	1/2-36	1-1/4-36	3/4-36	1-1/2-36	1-1/4-2-1/2	2-3-1/2	2-2-1/2	2-1/2-3-1/2	3-3-1/2	3-1/2-5	5-6	-
	-	-	-	-	3-36	4-36	3-5	4-6	4-6	6-14	8-10	-
	-	-	-	-	-	-	6-36	8-36	8-36	16-36	12-20	-
	-	-	-	-	-	-	-	-	-	-	22-36	-
Threaded Class 6000	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	-
	1/4-3/8	3/8-1	1/2	3/4	1	1-1/4-1-1/2	1-1/2	2	2-1/2	3	4	-
	1/2-36	1-1/4-36	3/4-36	1-1-1/4	1-1/4-2-1/2	2-3-1/2	2-2-1/2	2-1/2-3-1/2	3-3-1/2	3-1/2	5	-
	-	-	-	1-1/2-36	3-36	4-8	3-5	4-6	4-5	4	6	-
	-	-	-	-	-	10-36	6-36	8-36	6-10	5-6	8-10	-
	-	-	-	-	-	-	-	-	12-26	8-12	12-18	-
	-	-	-	-	-	-	-	-	28-36	14-36	20-36	-

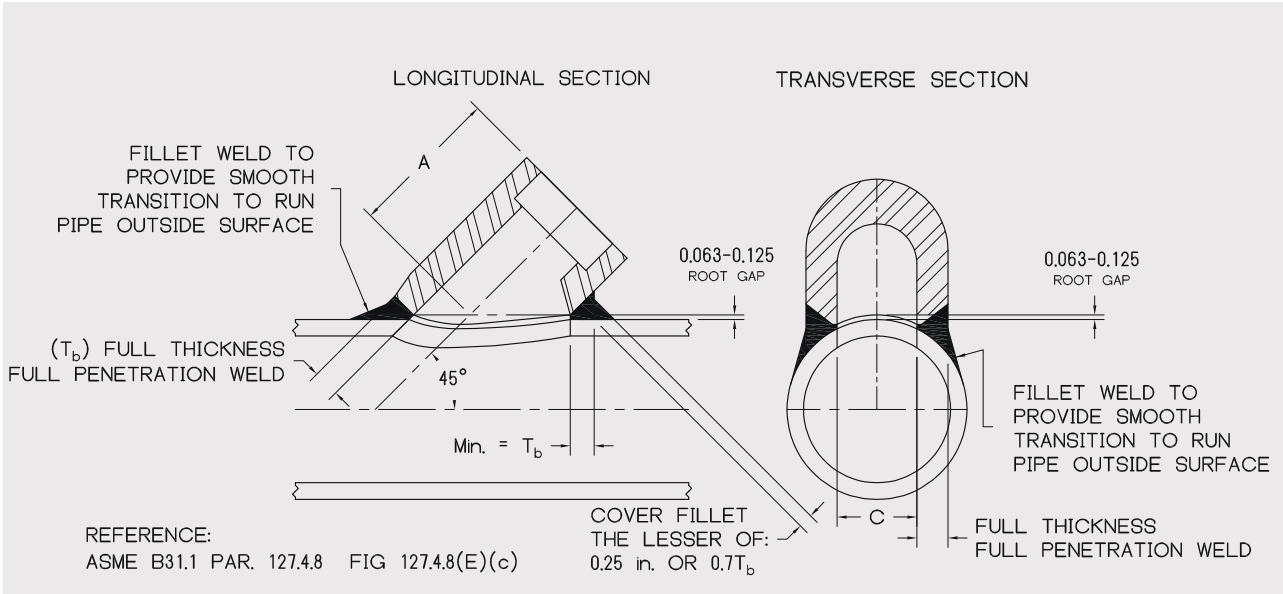
NOTES : 1. LARGER SIZES, SPECIAL DIMENSIONS AND SPECIAL THREADS AVAILABLE
2. DIMENSION B IS MINIMUM OF PERFECT THREAD. THE LENGTH OF USEFUL THREAD (B PLUS THREADS WITH FULLY FORMED ROOTS AND FLAT CRESTS) SHALL NOT BE LESS THAN L2 (EFFECTIVE LENGTH OF EXTERNAL THREADED) PER ASME B1.20.1
3. T_b AVAILABLE UPON REQUEST 4. WEIGHTS BASED ON CARBON STEEL



SOCKET WELD LATERAL OUTLET



SIZE : 1/4 - 2 IDENTIFICATION : 3000, 6000, 9000
MATERIAL : ALL ASTM / ASME MATERIAL GRADES
PRODUCT CONFORMITY : MSS SP-97, ASME B16.11, ASME B31.1, ASME B31.3



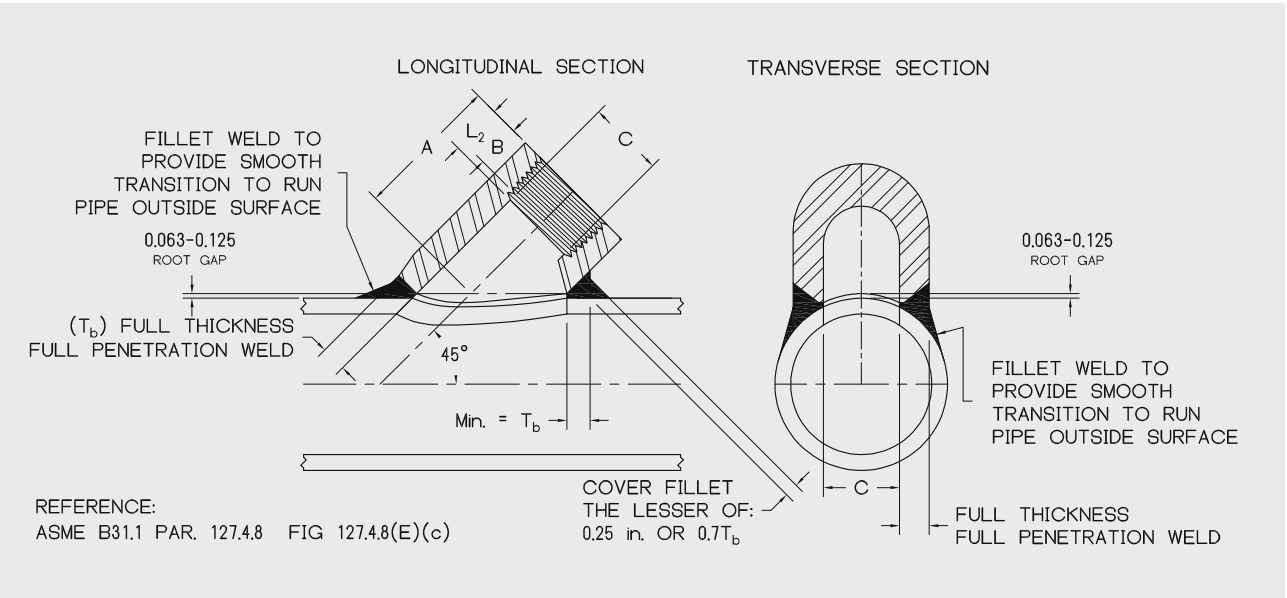
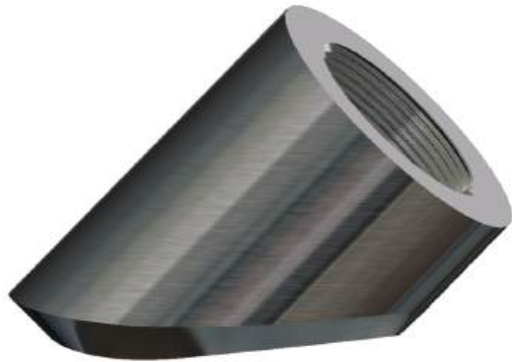
DIMENSIONS AND CONSOLIDATIONS										
NPS	SOCKET DEPTH	CL.3000 (3M)			CL.6000 (6M)			CL.9000 (9M)		
		RUN PIPE CORRELATION: X-STG			RUN PIPE CORRELATION: SCH.160			RUN PIPE CORRELATION: XX-STG		
		A	C	CONSOLIDATION	A	C	CONSOLIDATION	A	C	CONSOLIDATION
1/4	0.375	1 9/16	0.364	36 - 1/4						
3/8	0.375	1 9/16	0.493	36 - 3/8						
1/2	0.375	1 9/16	0.622	1/2 36 - 3/4	1 7/8	0.464	36 - 1/2	1 7/8	0.252	36 - 1/2
3/4	0.375	1 7/8	0.824	1 - 3/4 36 - 1 1/4	2 3/16	0.612	36 - 3/4	2 3/16	0.434	36 - 3/4
1	0.500	2 3/16	1.049	1 1/2 - 1 1/4 36 - 2	2 1/2	0.815	1 36 - 1 1/4	2 1/2	0.599	36 - 1
1 1/4	0.500	2 1/2	1.380	1 1/2 - 1 1/4 3 - 2 36 - 3 1/2	2 5/8	1.160	2 - 1 1/4 36 - 2 1/2	2 5/8	0.896	1 1/4 36 - 1 1/2
1 1/2	0.500	2 9/16	1.610	2 - 1 1/2 4 - 2 1/2 36 - 5	3 1/8	1.338	1 1/2 3 - 2 36 - 3 1/2	3 1/8	1.100	2 - 1 1/2 36 - 2 1/2
2	0.625	3 1/16	2.067	2 2 1/2 3 1/2 - 3 6 - 4 36 - 8	3 1/8	1.687	2 1/2 - 2 5 - 3 36 - 6	3 1/8	1.503	2 4 - 2 1/2 36 - 5

NOTES : 1. LARGER SIZES AND SPECIAL DIMENSIONS AVAILABLE 2. T_b AVAILABLE UPON REQUEST
2. TYPICAL SOCKET DEPTH TOLERANCE: +.063 / - .000



THREADED LATERAL OUTLET

SIZE : 1/2 - 2 CLASS : 3000, 6000, 10000
MATERIAL : ALL ASTM / ASME MATERIAL GRADES
PRODUCT CONFORMITY : MSS SP-97, ASME B16.11, ASME B1.20.1 (NPT), B31.1, B31.3



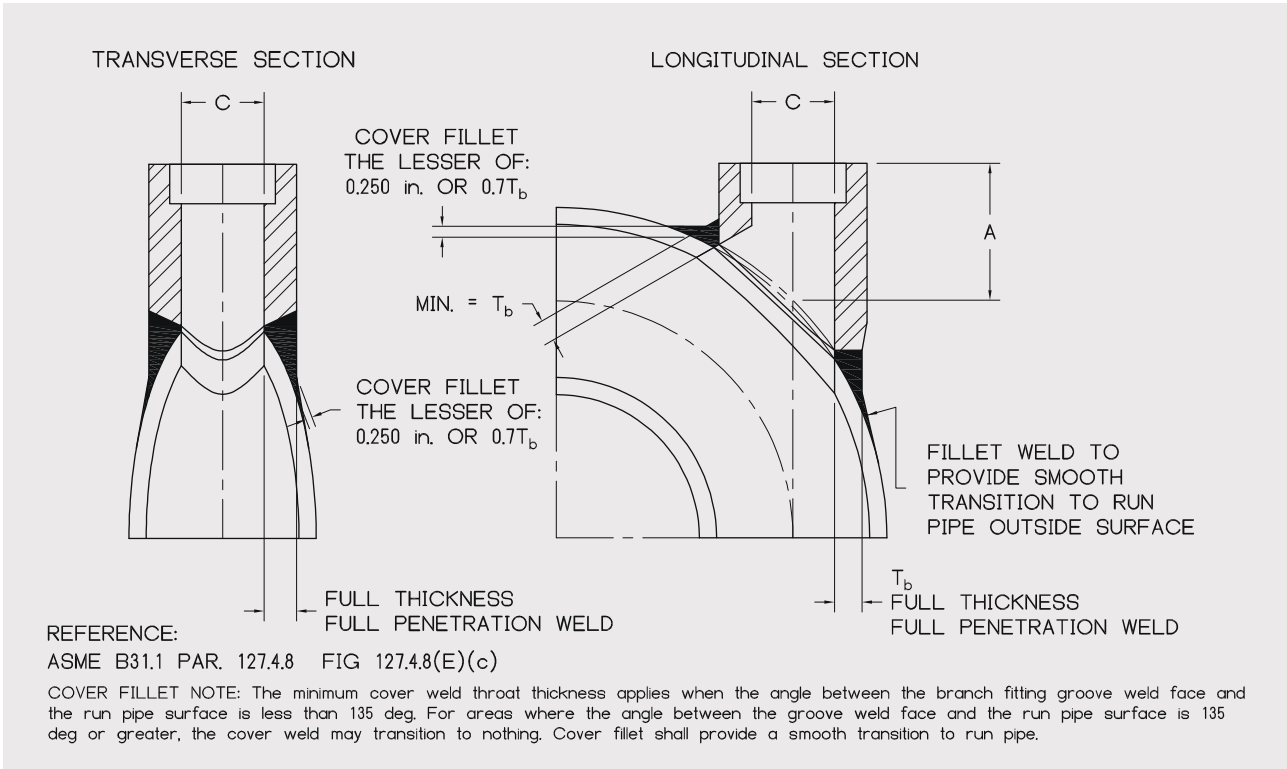
DIMENSIONS AND CONSOLIDATIONS												
NPS	SEE NOTE 2		CONSOLIDATION (ALL CLASSES)	CL.3000 (3M) RUN PIPE CORRELATION: X-STG			CL.6000 (6M) RUN PIPE CORRELATION: SCH.160			CL.10000 (10M) RUN PIPE CORRELATION: XX-STG		
	B	L ₂		A	C	WT	A	C	WT	A	C	WT
1/2	0.43	0.5337	3/4 - 1/2 36 - 1	1.563	0.718	0.27	2	0.718	0.77	2.125	0.718	1.17
3/4	0.50	0.5457	3/4 1 1/4 - 1 36 - 1 1/2	1.875	0.922	0.42	2.313	0.922	1.14	2.563	0.922	2.35
1	0.58	0.6828	1 2 - 1 1/4 36 - 2 1/2	2.188	1.141	0.87	2.688	1.141	2.23	2.813	1.141	3.05
1 1/4	0.67	0.7068	1 1/4 2 - 1 1/2 4 - 2 1/2 36 - 5	2.500	1.500	1.61	2.875	1.500	2.63	3.125	1.500	4.68
1 1/2	0.70	0.7235	1 1/2 2 1/2 - 2 5 - 3 36 - 6	2.563	1.734	2.02	3.188	1.718	4.32	3.500	1.734	7.85
2	0.75	0.7565	2 2 1/2 3 4 - 3 1/2 8 - 5 36 - 10	3.063	2.219	2.97	3.875	2.188	7.37	4.188	2.219	12.39

NOTES : 1. LARGER SIZES, SPECIAL DIMENSIONS AND SPECIAL THREADS AVAILABLE
2. DIMENSION B IS MINIMUM OF PERFECT THREAD. THE LENGTH OF USEFUL THREAD (B PLUS THREADS WITH FULLY FORMED ROOTS AND FLAT CRESTS) SHALL NOT BE LESS THAN L2 (EFFECTIVE LENGTH OF EXTERNAL THREADED) PER ASME B1.20.1
3. Tb AVAILABLE UPON REQUEST



SOCKET WELD ELBOW OUTLET

SIZE : 1/4 - 2 IDENTIFICATION : 3000, 6000, 9000
MATERIAL : ALL ASTM / ASME MATERIAL GRADES
PRODUCT CONFORMITY : MSS SP-97, ASME B16.11, ASME B31.1, ASME B31.3



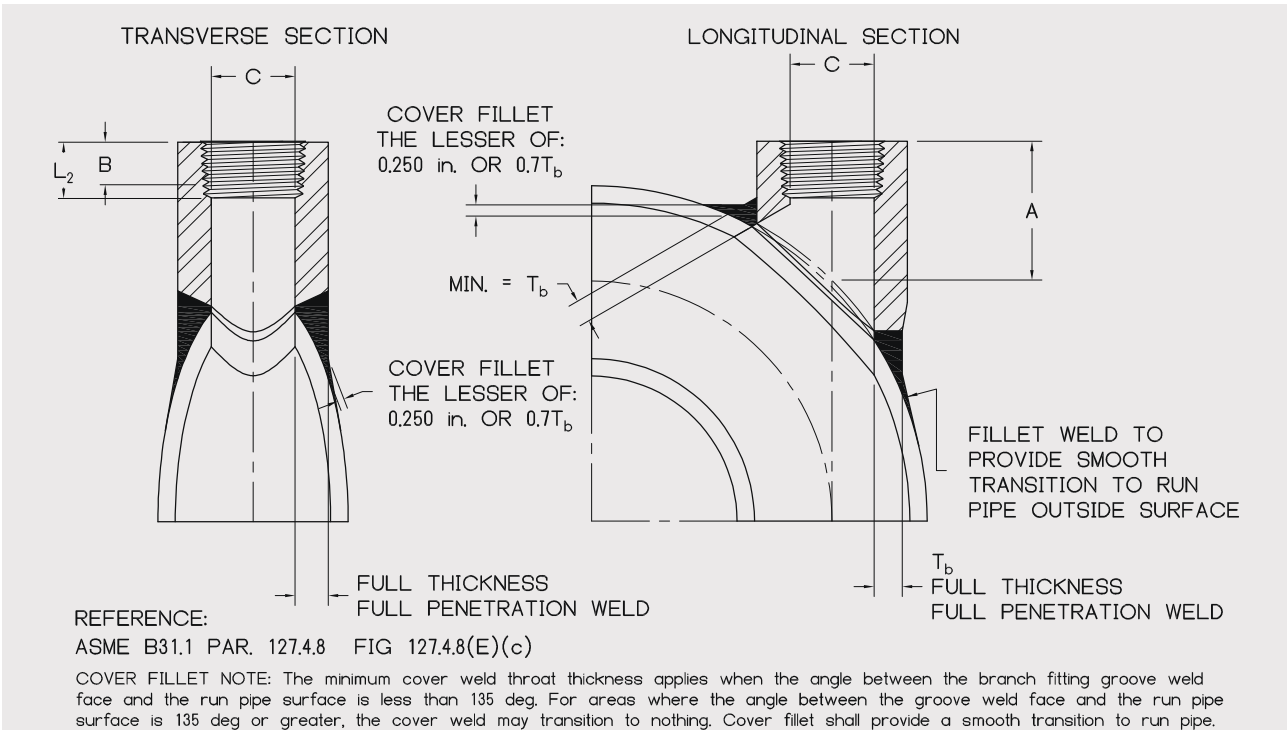
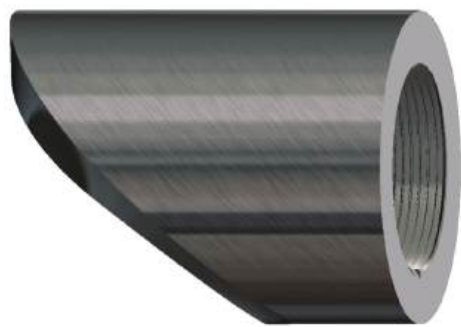
DIMENSIONS AND CONSOLIDATIONS										
NPS	SOCKET DEPTH	CL.3000 (3M) RUN PIPE CORRELATION: X-STG			CL.6000 (6M) RUN PIPE CORRELATION: SCH.160			CL.9000 (9M) RUN PIPE CORRELATION: XX-STG		
		A	C	CONSOLIDATION	A	C	CONSOLIDATION	A	C	CONSOLIDATION
1/4	0.375	1.188	0.364							
3/8	0.375	1.375	0.493							
1/2	0.375	1.563	0.622	36 - 3/4	1.938	0.464	36 - 3/4	2.063	0.252	36 - 3/4
3/4	0.375	1.875	0.824	36 - 1	2.313	0.612	36 - 1	2.375	0.434	36 - 1
1	0.500	2.188	1.049	36 - 2	2.563	0.815	36 - 2	2.688	0.599	36 - 2
1 1/4	0.500	2.500	1.380	36 - 2	2.813	1.160	36 - 2	3.000	0.896	36 - 2
1 1/2	0.500	2.625	1.610	36 - 2	3.188	1.338	36 - 2	3.188	1.100	36 - 2
2	0.625	3.063	2.067	36 - 3	3.688	1.687	36 - 3	3.813	1.503	36 - 3

NOTES : 1. LARGER SIZES AND SPECIAL DIMENSIONS AVAILABLE
2. Tb AVAILABLE UPON REQUEST
3. TYPICAL SOCKET DEPTH TOLERANCE: +.063 / - .000



THREADED ELBOW OUTLET

SIZE : 1/4 - 2 CLASS : 3000, 6000, 10000
MATERIAL : ALL ASTM / ASME MATERIAL GRADES
PRODUCT CONFORMITY : MSS SP-97, ASME B16.11, ASME B1.20.1 (NPT), B31.1, B31.3



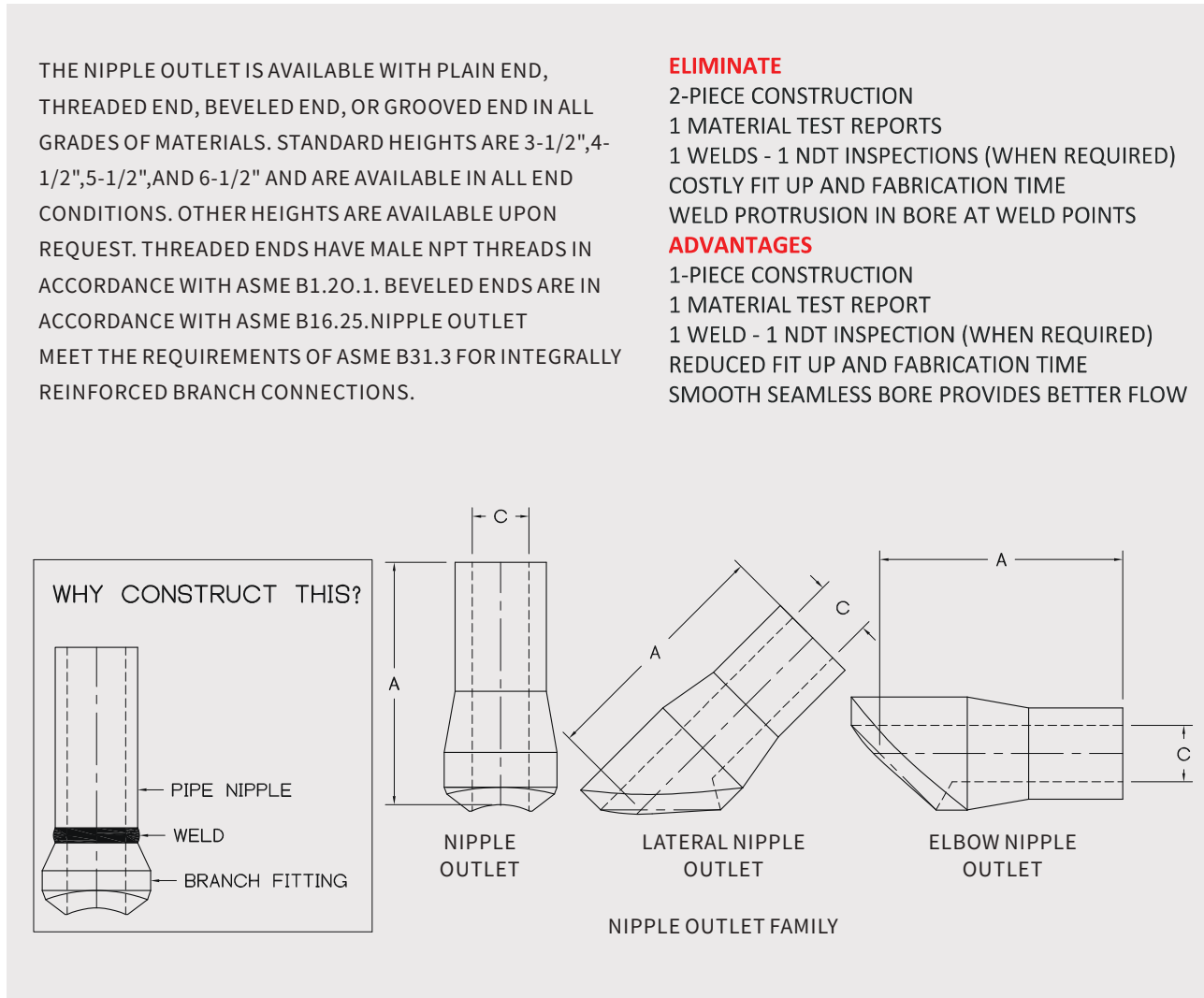
DIMENSIONS AND CONSOLIDATIONS												
NPS	SEE NOTE 2		CONSOLIDATION (ALL CLASSES)	CL.3000 (3M) RUN PIPE CORRELATION: X-STG			CL.6000 (6M) RUN PIPE CORRELATION: SCH.160			CL.10000 (10M) RUN PIPE CORRELATION: XX-STG		
	B	L ₂		A	C	WT	A	C	WT	A	C	WT
1/4	0.32	0.4018	36 - 3/4	1.125	0.437	0.15	1.563	0.437	0.28	1.625	0.437	0.49
3/8	0.36	0.4078	36 - 3/4	1.25	0.578	0.18	1.625	0.578	0.43	1.688	0.578	0.69
1/2	0.43	0.5337	36 - 3/4	1.375	0.718	0.28	1.750	0.718	0.78	1.750	0.718	0.99
3/4	0.50	0.5457	36 - 1	1.563	0.922	0.43	2.000	0.922	1.13	2.063	0.922	1.95
1	0.58	0.6828	36 - 2	1.938	1.141	0.84	2.250	1.141	2.06	2.313	1.141	2.59
1 1/4	0.67	0.7068	36 - 2	2.125	1.500	1.54	2.500	1.500	2.50	2.625	1.500	4.05
1 1/2	0.70	0.7235	36 - 2	2.313	1.734	1.98	2.750	1.734	4.16	2.938	1.734	6.7
2	0.75	0.7565	36 - 3	2.688	2.219	3.03	3.375	2.219	7.31	3.500	2.219	10.69

NOTES : 1. LARGER SIZES, SPECIAL DIMENSIONS AND SPECIAL THREADS AVAILABLE
2. DIMENSION B IS MINIMUM OF PERFECT THREAD. THE LENGTH OF USEFUL THREAD (B PLUS THREADS WITH FULLY FORMED ROOTS AND FLAT CRESTS) SHALL NOT BE LESS THAN L2 (EFFECTIVE LENGTH OF EXTERNAL THREADED) PER ASME B1.20.1
3. T_b AVAILABLE UPON REQUEST



NIPPLE OUTLET

SIZE : 1/2 - 4 IDENTIFICATION : X-STG, SCH.160, AND XX-STG
MATERIAL : ALL ASTM / ASME MATERIAL GRADES
PRODUCT CONFORMITY : MSS SP-97, ASME B1.20.1 (NPT) B31.1, B31.3



DIMENSIONS AND WEIGHTS									
NPS	STANDARD HEIGHTS "A"				BORE "C"			WT 90° FITTING 3 1/2 LG	
	3 1/2	4 1/2	5 1/2	6 1/2	X-STG	SCH.160	XX-STG	XSTG	SCH.160 XX-STG
1/2	3 1/2	4 1/2	5 1/2	6 1/2	0.546	0.464	0.252	0.68	0.73 0.83
3/4	3 1/2	4 1/2	5 1/2	6 1/2	0.742	0.612	0.434	0.77	0.89 1.01
1	3 1/2	4 1/2	5 1/2	6 1/2	0.957	0.815	0.599	0.85	1.03 1.23
1 1/4	3 1/2	4 1/2	5 1/2	6 1/2	1.278	1.160	0.896	1.63	1.82 2.16
1 1/2	3 1/2	4 1/2	5 1/2	6 1/2	1.500	1.338	1.100	1.92	2.22 2.58
2	3 1/2	4 1/2	5 1/2	6 1/2	1.939	1.687	1.503	2.44	3.04 3.40

NOTES: SPECIAL DIMENSIONS AVAILABLE BY REQUEST



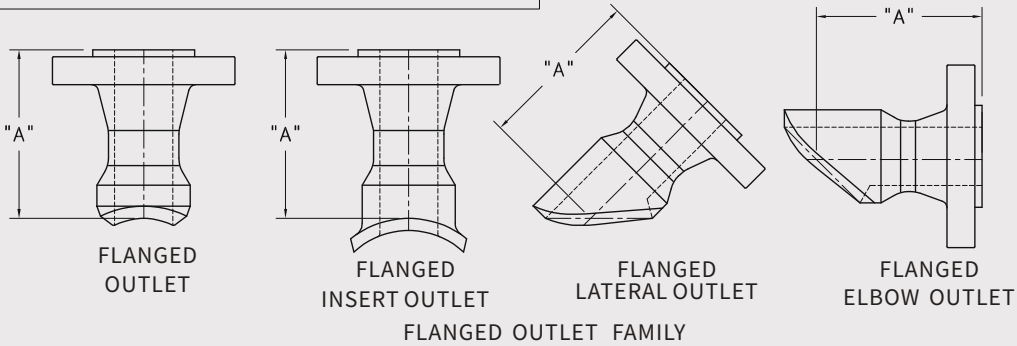
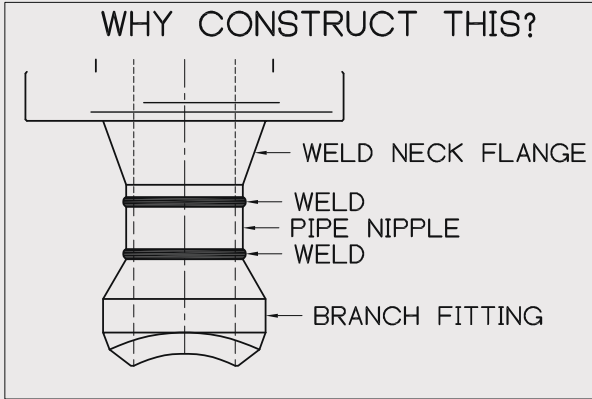
FLANGED OUTLET

SIZE : 1/2 - 4 **IDENTIFICATION :** CL.150 THROUGH CL.2500
MATERIAL : ALL ASTM / ASME MATERIAL GRADES
PRODUCT CONFORMITY : MSS SP-97, ASME B16.5, B31.1, B31.3



THE FLANGED OUTLET IS AVAILABLE WITH ANY STANDARD FACING AND WITH ANY SPECIFIED BORE. SPECIAL FACINGS MACHINED TO YOUR REQUIREMENTS CAN ALSO BE ACCOMMODATED. THE FLANGED OUTLET IS IDEAL FOR MULTIPLE MANIFOLD OUTLETS WHERE CONSISTENT FLANGE FACE HEIGHT IS REQUIRED. FLANGE DIMENSIONS AND TOLERANCES ARE IN ACCORDANCE WITH ASME B16.5.

- ELIMINATE**
- *3-PIECE CONSTRUCTION
 - *2 MATERIAL TEST REPORTS
 - *2 WELDS - 2 NDT INSPECTIONS (WHEN REQUIRED)
 - *COSTLY FIT UP AND FABRICATION TIME
 - *WELD PROTRUSION IN BORE AT WELD POINTS
 - *INCONSISTENT FLANGE FACE HEIGHT
- ADVANTAGES**
- *1-PIECE CONSTRUCTION
 - *1 MATERIAL TEST REPORT
 - *1 WELD - 1 NDT INSPECTION (WHEN REQUIRED)
 - *REDUCED FIT UP AND FABRICATION TIME
 - *CONSISTENT FLANGE FACE HEIGHT
 - *SMOOTH SEAMLESS BORE PROVIDES BETTER FLOW

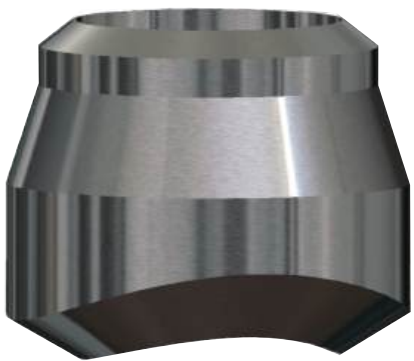


CL.150		CL.300		CL.400/600		CL.900/1500		CL.2500	
NPS	A	NPS	A	NPS	A	NPS	A	NPS	A
1/2	6	1/2	6	1/2	6	1/2	6*	1/2	6*
3/4	6	3/4	6	3/4	6	3/4	6*	3/4	6*
1	6	1	6	1	6	1	6*	1	6*
1 1/4	6	1 1/4	6	1 1/4	6	1 1/4	6*	1 1/4	6*
1 1/2	6	1 1/2	6	1 1/2	6	1 1/2	6*	1 1/2	9
2	6	2	6	2	6	2	9	2	9

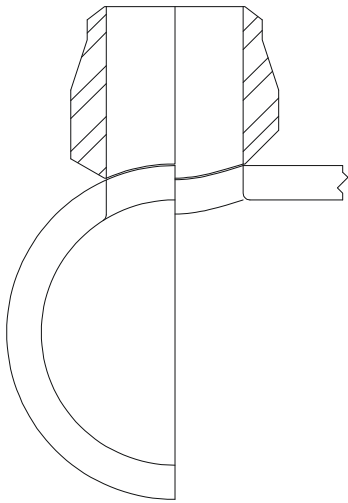
NOTES: CL.1500 AND 2500 FLANGED LATERAL AND ELBOW OUTLET, A = 9.
SPECIAL DIMENSIONS AVAILABLE BY REQUEST
UNLESS SPECIFIED OTHERWISE, FLANGE DIMENSIONS ARE IN ACC. WITH ASME B16.5, LATEST EDITION



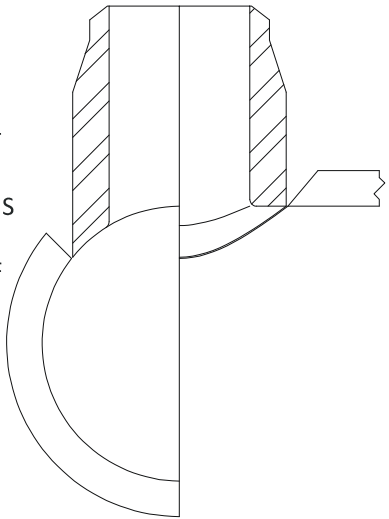
SPECIALTY NOZZLES



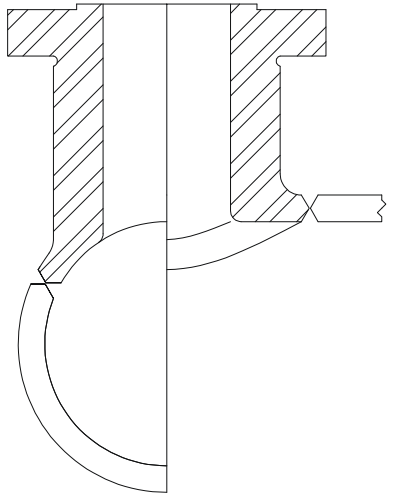
BUTT WELD NOZZLES ARE MOST COMMONLY PRODUCED IN CHARTED WALL THICKNESSES / SCHEDULES. THEY ARE AVAILABLE IN ANY COMBINATION OF OD AND WALL THICKNESS IMAGINABLE. WE WILL MANUFACTURE TO YOUR SPECIFIED DIMENSIONS.



NOZZLES CAN BE MANUFACTURED AS FLAT OR CONTOURED FOR EITHER A SET-ON OR SET-IN APPLICATION. THE CONTOUR RADIUS WILL MATCH THE RADIUS OF EITHER THE OUTER DIAMETER OR INNER DIAMETER OF THE HEADER VESSEL.



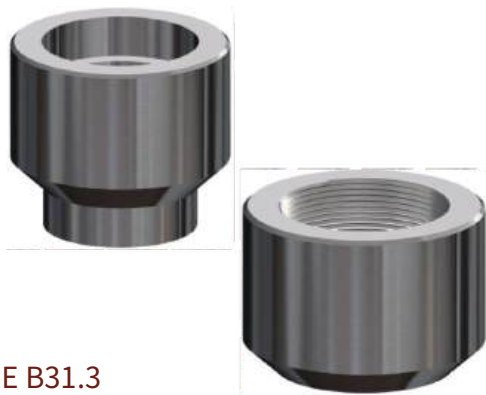
NOZZLES CAN BE MANUFACTURED WITH A FLANGE FACING TO MATCH ASME OR API REQUIREMENTS. INSERT NOZZLES CAN ALSO BE PROVIDED WITH AN INSERT OR "Q" STYLE LIP.



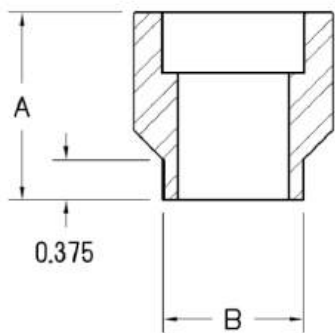


COUPLETS AND WELD BOSSES

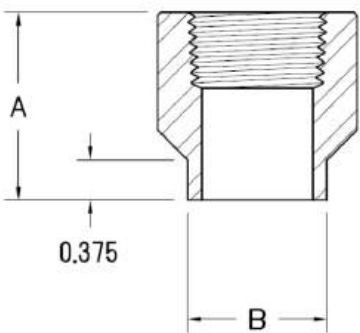
SIZE : 1/2 - 2 CLASS : 3000, 6000, 9000
MATERIAL: ALL ASTM / ASME MATERIAL GRADES
PRODUCT CONFORMITY: ASME B16.11, ASME B31.1, ASME B31.3



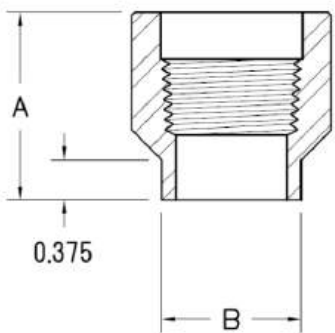
SOCKET-WELD
COUPLET BOSS (SWCB)



THREADED
COUPLET BOSS (THCB)

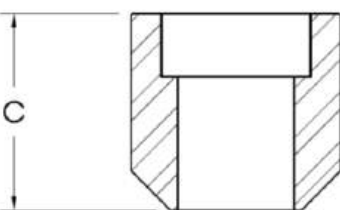


COMBINATION
COUPLET BOSS (CBCB)

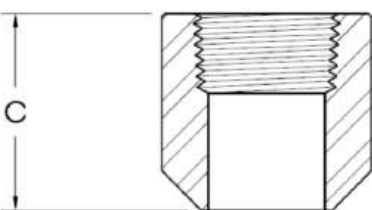


COUPLETS AND WELD BOSSES BASIC DIMENSIONS							
CLASS 3000 & 6000		0.5	0.7	1	1.25	1.5	2
A	SOCKET	1.313	1.375	1.688	1.875	2.000	2.250
	THREADED	1.313	1.375	1.688	1.875	2.000	2.250
	COMBINATION	1.688	1.875	2.188	2.375	2.500	2.875
B	SOCKET	0.938	1.063	1.313	1.688	1.938	2.438
	THREADED	0.938	1.063	1.313	1.688	1.938	2.438
	COMBINATION	0.938	1.063	1.313	1.688	1.938	2.438
C	SOCKET	1.250	1.438	1.625	1.688	1.750	2.250
	THREADED	0.938	1.000	1.188	1.313	1.563	1.688
	COMBINATION	1.313	1.500	1.688	1.813	2.063	1.313

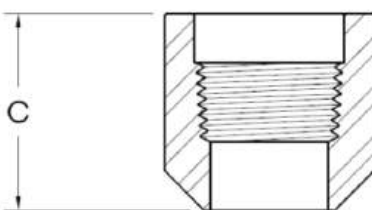
SOCKET-WELD
WELD BOSS (SWWB)



THREADED
WELD BOSS (THWB)



COMBINATION
WELD BOSS (CBWB)



NOTES: 1. SPECIAL DIMENSIONS AS AVAILABLE UPON REQUEST

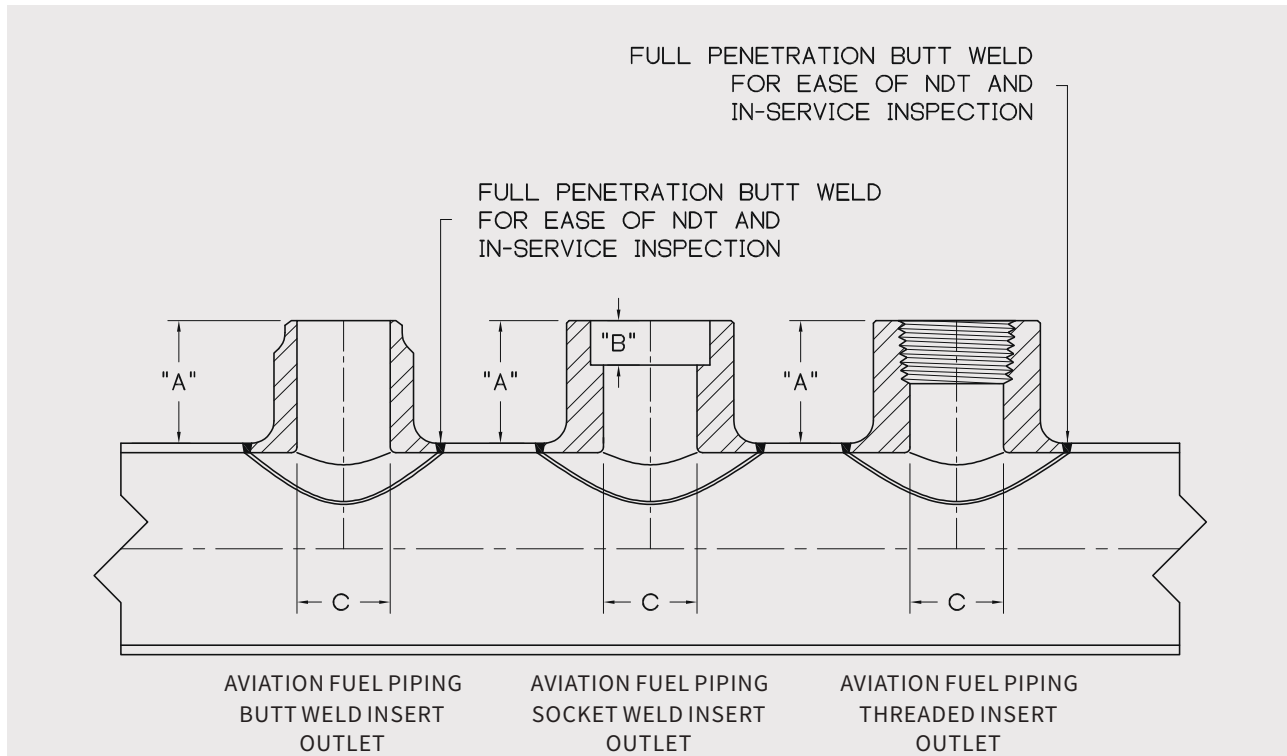


AVIATION FUEL PIPING INSERT OUTLET

SIZE: 1/2-2
IDENTIFICATION: SCH.10s, SCH.40s, SCH.80s, CL.150, CL.300, CL.3000
MATERIAL: A105, F304/F316/L



PRODUCT CONFORMITY: MSS SP-97, ASME B16.11, ASME B1.20.1 (NPT), ASME B31.1, ASME B31.3
AVIATION FUEL INSERT OUTLET ARE DESIGNED SPECIFICALLY FOR AVIATION FUEL PIPING WHERE A FULLY INTERPRETABLE X-RAY IS REQUIRED AT THE OUTLET-TO-HEADER WELD. THE AVIATION INSERT OUTLET IS DESIGNED AND CONTOURED TO PROVIDE A FLUSH FIT WITH THE RUN PIPE O.D. AND I.D. IN MOST APPLICATIONS, THE AVIATION INSERT OUTLET IS ROUND, FACILITATING THE USE OF AUTOMATIC CIRCLE BURNING AND WELDING EQUIPMENT.



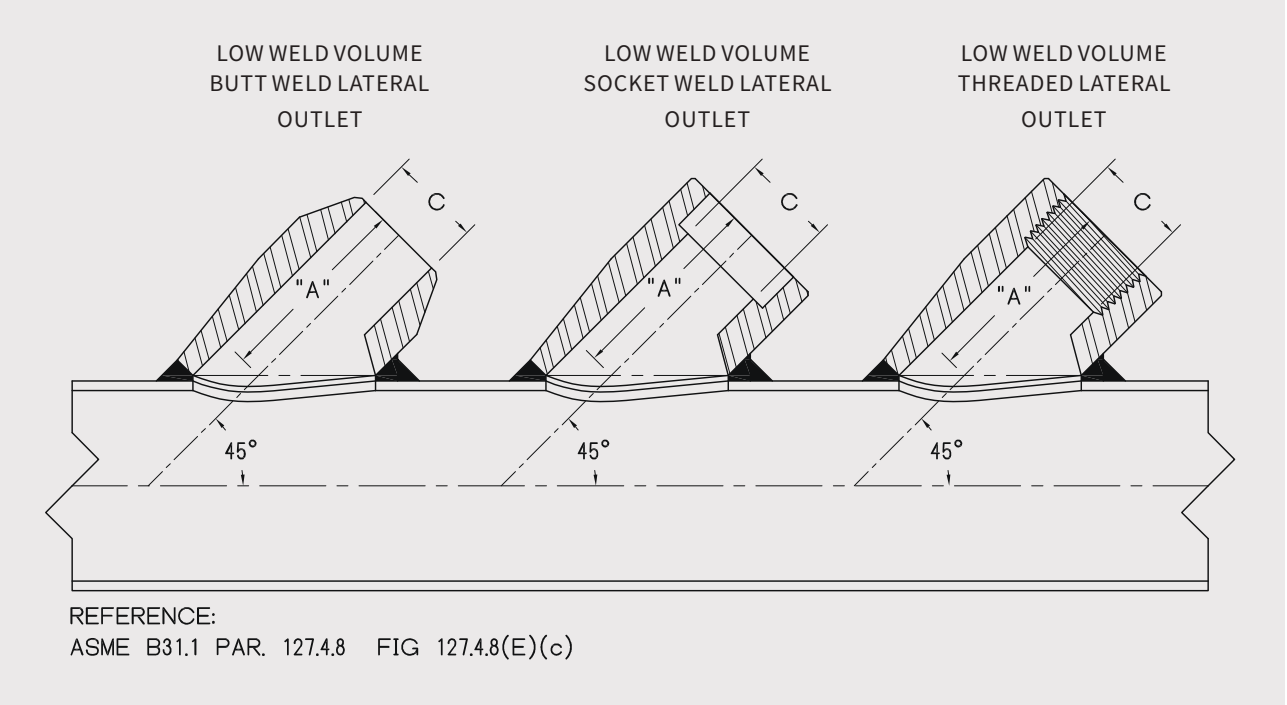
BASIC DIMENSIONS AND CONSOLIDATIONS										
NPS	STD BUTT WELD			3M SOCKET WELD				3M THREADED		
	A	C	HEADER RANGE	A	B	C	HEADER RANGE	A	C	HEADER RANGE
1/2	1.250	0.622	≥ NPS 1	0.938	0.375	0.622	≥ NPS 1	1.000	0.703	≥ NPS 1
3/4	1.250	0.824	≥ NPS 1 1/4	1.063	0.500	0.824	≥ NPS 1 1/4	1.063	0.906	≥ NPS 1 1/4
1	1.250	1.049	≥ NPS 1 1/2	1.313	0.500	1.049	≥ NPS 1 1/2	1.313	1.141	≥ NPS 1 1/2
1 1/4	1.250	1.380	≥ NPS 2	1.313	0.500	1.380	≥ NPS 2	1.313	1.484	≥ NPS 2
1 1/2	1.500	1.610	≥ NPS 2 1/2	1.375	0.500	1.610	≥ NPS 2 1/2	1.375	1.719	≥ NPS 2 1/2
2	1.750	2.067	≥ NPS 3	1.500	0.625	2.067	≥ NPS 3	1.500	2.188	≥ NPS 3

NOTES: 1. LARGER SIZES AND SPECIAL DIMENSIONS AVAILABLE



LOW WELD VOLUME LATERAL OUTLET

SIZE : 1/2 - 2 IDENTIFICATION: SCH.10s, SCH.40s CL.3000
MATERIAL : STAINLESS F304L & F316L
PRODUCT CONFORMITY : MSS SP-97, ASME B16.11, ASME B1.20.1 (NPT), ASME B31.1, ASME B31.3



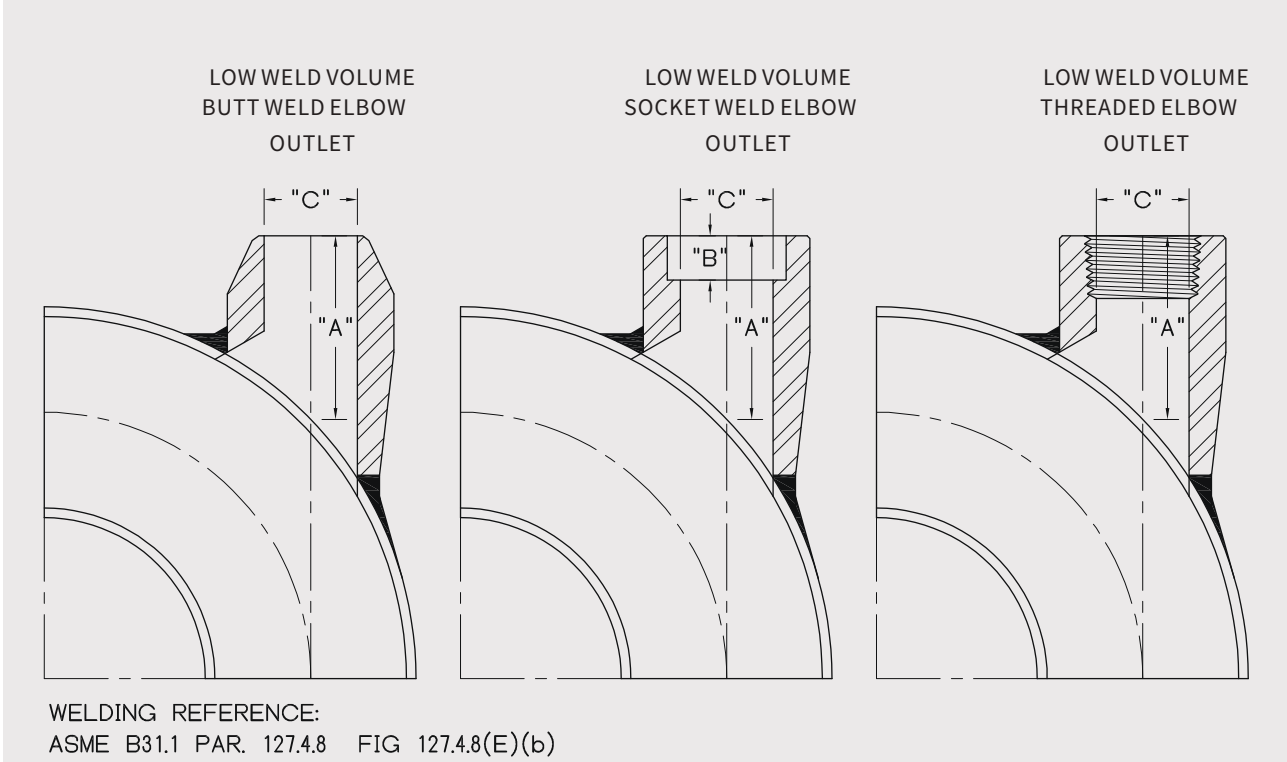
BASIC DIMENSIONS AND CONSOLIDATIONS										
NPS	SCH.10s BUTT WELD			SOCKET WELD				THREADED		
	A	C	CONSOLIDATION	A	B	C	CONSOLIDATION	A	C	CONSOLIDATION
1/2	1.563	0.674	1/2 36 - 3/4	1.563	0.375	0.622	1/2 36 - 3/4	1.563	0.703	3/4 - 1/2 36 - 1
3/4	1.813	0.884	1 1/4 - 3/4 36 - 1 1/2	1.875	0.500	0.824	1 - 3/4 36 - 1 1/4	1.872	0.906	3/4 1 1/4 - 1 36 - 1 1/2
1	2.188	1.097	1 2 - 1 1/4 36 - 2 1/2	2.188	0.500	1.049	1 1 1/2 - 1 1/4 36 - 2	2.188	1.141	1 2 - 1 1/4 36 - 2 1/2
1 1/4	2.188	1.442	1 1/2 - 1 1/4 3 1/2 - 2 36 - 4	2.500	0.500	1.380	1 1/2 - 1 1/4 3 - 2 36 - 3 1/2	2.500	1.484	1 1/4 2 - 1 1/2 4 - 2 1/2 36 - 5
1 1/2	2.563	1.682	1 1/2 2 1/2 - 2 5 - 3 36 - 6	2.563	0.500	1.610	2 - 1 1/2 4 - 2 1/2 36 - 5	2.563	1.719	1 1/2 2 1/2 - 2 5 - 3 36 - 6
2	2.938	2.157	2 2 1/2 4 - 3 8 - 5 36 - 10	3.063	0.625	2.067	2 2 1/2 3 1/2 - 3 6 - 4 36 - 8	3.063	2.188	2 2 1/2 3 4 - 3 1/2 8 - 5 36 - 10

NOTES : 1. LARGER SIZES AND SPECIAL DIMENSIONS AVAILABLE



LOW WELD VOLUME ELBOW OUTLET

SIZE : 1/2 - 2 IDENTIFICATION: SCH.10s, SCH.40s CL.3000
MATERIAL : STAINLESS F304L & F316L
PRODUCT CONFORMITY : MSS SP-97, ASME B16.11, ASME B1.20.1 (NPT), ASME B31.1, ASME B31.3



BASIC DIMENSIONS AND CONSOLIDATIONS										
NPS	SCH.10s BUTT WELD			SOCKET WELD				THREADED		
	A	C	CONSOLIDATION	A	B	C	CONSOLIDATION	A	C	CONSOLIDATION
1/2	1.188	0.674	36 - 3/4	1.563	0.375	0.622	36 - 3/4	1.375	0.703	36 - 3/4
3/4	1.375	0.884	36 - 1	1.875	0.500	0.824	36 - 1	1.563	0.906	36 - 1
1	1.688	1.097	36 - 2	2.188	0.500	1.049	36 - 2	1.938	1.141	36 - 2
1 1/4	2.063	1.442	36 - 2	2.500	0.500	1.380	36 - 2	2.125	1.484	36 - 2
1 1/2	2.250	1.682	36 - 2	2.563	0.500	1.610	36 - 2	2.313	1.719	36 - 2
2	2.625	2.157	36 - 3	3.063	0.625	2.067	36 - 3	2.688	2.188	36 - 3

NOTES : 1. LARGER SIZES AND SPECIAL DIMENSIONS AVAILABLE



HEAVY WALL FITTINGS AND SPECIALTY ITEMS



SEAMLESS BUTT WELD CROSS
DIMENSIONS: ASME B16.9
STYLES: STRAIGHT, REDUCING, CUSHION
SIZES: 1/2" THROUGH 24"
MATERIALS: ALL MATERIAL GRADES



SEAMLESS BUTT WELD WYE
STYLES: STRAIGHT, REDUCING, ECCENTRIC
SIZES: 1/2" THROUGH 24"
MATERIALS: ALL MATERIAL GRADES



SEAMLESS REDUCERS
DIMENSIONS: ASME B16.9
STYLES: CONCENTRIC, ECCENTRIC,
EXTREME REDUCTIONS, HEAVY WALLS
MATERIALS: ALL MATERIAL GRADES



SEAMLESS TRANSITION PIECES
STYLES: CONCENTRIC, ECCENTRIC,
EXTREME REDUCTIONS, HEAVY WALLS
MATERIALS: ALL MATERIAL GRADES



THERMOWELLS & SAMPLING NOZZLES
STYLES: SINGLE WELL, DOUBLE WELL,
STAGGERED ID, ANGULAR OFFSET OR STEPPED ID
MATERIALS: ALL MATERIAL GRADES



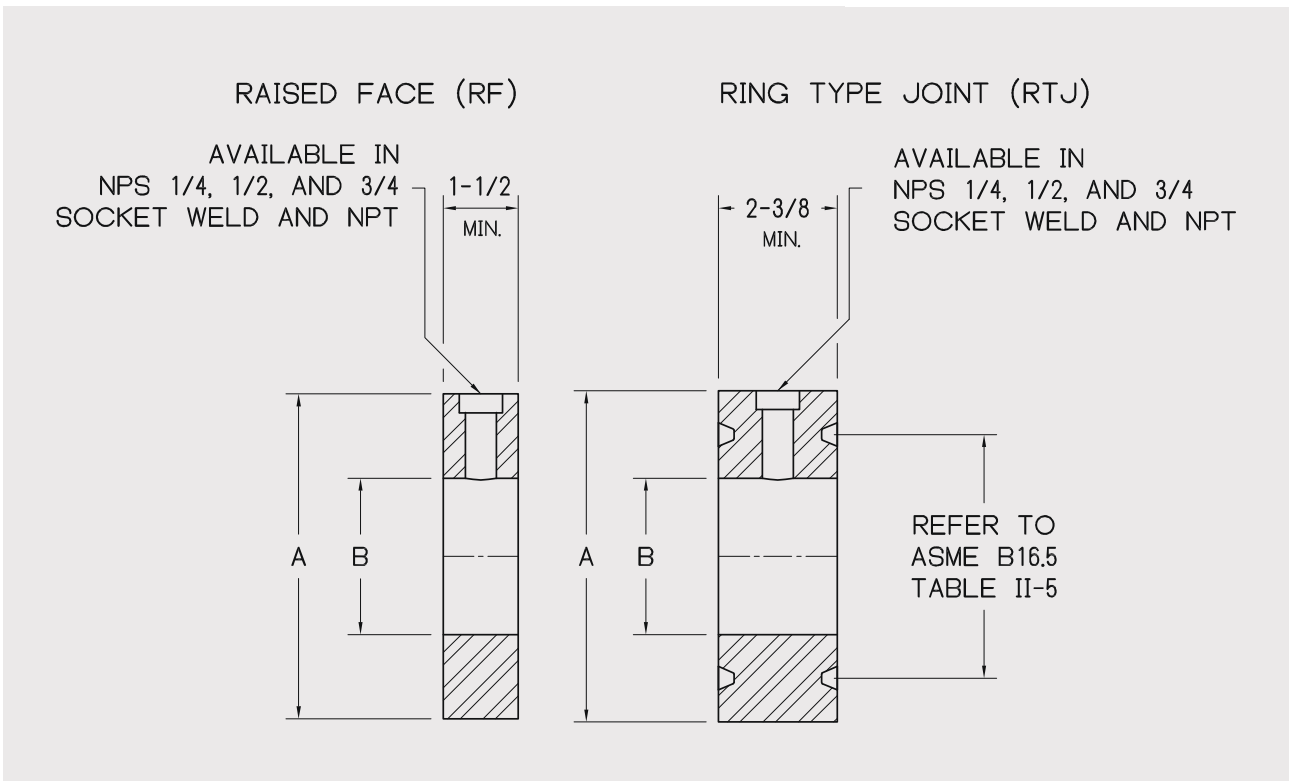
BUTT WELD CAP & HEMISPHERICAL HEADS
DIMENSIONS: ASME B16.9 & SECTION VIII-1
STYLES: UNCHARTED SIZES & HEAVY WALLS
MATERIALS: ALL MATERIAL GRADES



BLEED RINGS



SIZE : 1 - 24 IDENTIFICATION : CL.150 THROUGH CL.2500
MATERIAL : ALL ASTM / ASME MATERIAL GRADES
PRODUCT CONFORMITY : ASME B16.5

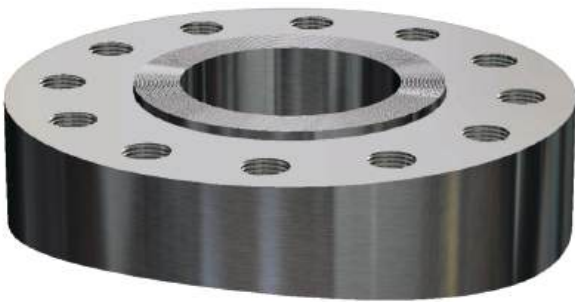


BASIC DIMENSIONS											
NPS	B	RAISED FACE "A" DIMENSION					RING TYPE JOINT "A" DIMENSION				
		CL.150	CL.300	CL.600	CL.900	CL.1500	CL.150	CL.300	CL.600	CL.900	CL.1500
1	1 1/8	2 1/2	2 3/4	2 3/4	3	3	2 1/2	2 3/4	2 3/4	2 13/16	2 13/16
1 1/2	1 5/8	3 1/4	3 5/8	3 5/8	3 3/4	3 3/4	3 1/4	3 9/16	3 9/16	3 5/8	3 5/8
2	2 1/8	4	4 1/4	4 1/4	5 1/2	5 1/2	4	4 1/4	4 1/4	4 7/8	4 7/8
2 1/2	2 1/2	4 3/4	5	5	6 3/8	6 3/8	4 3/4	5	5	5 3/8	5 3/8
3	3 1/8	5 1/4	5 3/4	5 3/4	6 1/2	6 3/4	5 1/4	5 3/4	5 3/4	6 5/8	6 5/8
4	4 1/8	6 3/4	7	7 1/2	8	8 1/8	6 3/4	6 7/8	6 7/8	7 5/8	7 5/8
6	6 1/8	8 5/8	9 3/4	10 3/8	11 1/4	11	8 5/8	9 1/2	9 1/2	9 1/2	9 3/4

NOTES: SPECIAL DIMENSIONS AVAILABLE
MULTIPLE TAPS AVAILABLE AND SPECIAL ORIENTATIONS AVAILABLE
LARGER TAPS AVAILABLE, HOWEVER RING THICKNESS MAY NEED TO BE INCREASED ACCORDINGLY



STUDDING OUTLETS



SIZE : 1/2 - 24 **IDENTIFICATION :** CL.150 THROUGH CL.2500

MATERIAL : ALL ASTM / ASME MATERIAL GRADES

PRODUCT CONFORMITY : ASME B16.5

STUDDING OUTLETS ARE AVAILABLE IN SIZES 1/2 THROUGH 24" FROM CL.150 TO 2500. THEY CAN BE PROVIDED AS FLAT OR CONTOURED TO FIT THE OD OR ID OF SHELLS, HEADS, OR CONES. OFFSETS FROM VESSEL / HEAD CENTERLINES CAN ALSO BE ACCOMMODATED. SPECIAL MACHINING FOR SIGHT GLASS ASSEMBLIES IN ACCORDANCE WITH YOUR SPECIFIED DIMENSIONS CAN BE ACCOMMODATED. WE CAN ALSO PROVIDE AIR TEST HOLES UPON REQUEST.

CLASS 150										
NPS (Inner Dia.)	Flange Thickness	Outer Diameter	Raised Face	Bolt Circle	No. of Holes	Hole Size	Hole Depth	STUD BOLT		
								Thrd Size	T.P.I.	Thrd Depth
1/2	1.250	3.500	1.375	2.375	4	27/64	0.875	1/2	13	0.563
3/4	1.250	3.875	1.688	2.750	4	27/64	0.875	1/2	13	0.563
1	1.250	4.250	2.000	3.125	4	27/64	0.875	1/2	13	0.563
1 1/4	1.250	4.625	2.500	3.500	4	27/64	0.875	1/2	13	0.563
1 1/2	1.250	5.000	2.875	3.875	4	27/64	0.875	1/2	13	0.563
2	1.500	6.000	3.625	4.750	4	17/32	1.125	5/8	11	0.750
2 1/2	1.500	7.000	4.125	5.500	4	17/32	1.125	5/8	11	0.750
3	1.500	7.500	5.000	6.000	4	17/32	1.125	5/8	11	0.750
3 1/2	1.500	8.500	5.500	7.000	8	17/32	1.125	5/8	11	0.750
4	1.500	9.000	6.188	7.500	8	17/32	1.125	5/8	11	0.750
5	1.750	10.000	7.313	8.500	8	21/32	1.313	3/4	10	0.875
6	1.750	11.000	8.500	9.500	8	21/32	1.313	3/4	10	0.875
8	1.750	13.500	10.625	11.750	8	21/32	1.313	3/4	10	0.875
10	1.813	16.000	12.750	14.250	12	49/64	1.438	7/8	9	1.000
12	1.813	19.000	15.000	17.000	12	49/64	1.438	7/8	9	1.000

CLASS 300										
NPS (Inner Dia.)	Flange Thickness	Outer Diameter	Raised Face	Bolt Circle	No. of Holes	Hole Size	Hole Depth	STUD BOLT		
								Thrd Size	T.P.I.	Thrd Depth
1/2	1.250	3.750	1.375	2.625	4	27/64	0.875	1/2	13	0.563
3/4	1.500	4.625	1.688	3.250	4	17/32	1.125	5/8	11	0.750
1	1.500	4.875	2.000	3.500	4	17/32	1.125	5/8	11	0.750
1 1/4	1.500	5.250	2.500	3.875	4	17/32	1.125	5/8	11	0.750
1 1/2	1.750	6.125	2.875	4.500	4	21/32	1.313	3/4	10	0.875
2	1.500	6.500	3.625	5.000	8	17/32	1.125	5/8	11	0.750
2 1/2	1.750	7.500	4.125	5.875	8	21/32	1.313	3/4	10	0.875
3	1.750	8.250	5.000	6.625	8	21/32	1.313	3/4	10	0.875
3 1/2	1.750	9.000	5.500	7.250	8	21/32	1.313	3/4	10	0.875
4	1.750	10.000	6.188	7.875	8	21/32	1.313	3/4	10	0.875
5	1.750	11.000	7.313	9.250	8	21/32	1.313	3/4	10	0.875
6	1.750	12.500	8.500	10.625	12	21/32	1.313	3/4	10	0.875
8	1.875	15.000	10.625	13.000	12	49/64	1.438	7/8	9	1.000
10	2.125	17.500	12.750	15.250	16	7/8	1.563	1	8	1.125
12	2.250	20.500	15.000	17.750	16	1	1.813	1 1/8	8	1.250

CLASS 600										
NPS (Inner Dia.)	Flange Thickness	Outer Diameter	Raised Face	Bolt Circle	No. of Holes	Hole Size	Hole Depth	STUD BOLT		
								Thrd Size	T.P.I.	Thrd Depth
1/2	1.500	3.750	1.375	2.625	4	27/64	0.875	1/2	13	0.563
3/4	1.750	4.625	1.688	3.250	4	17/32	1.125	5/8	11	0.750
1	1.750	4.875	2.000	3.500	4	17/32	1.125	5/8	11	0.750
1 1/4	1.750	5.250	2.500	3.875	4	17/32	1.125	5/8	11	0.750
1 1/2	1.938	6.125	2.875	4.500	4	21/32	1.313	3/4	10	0.875
2	1.750	6.500	3.625	5.000	8	17/32	1.125	5/8	11	0.750
2 1/2	2.000	7.500	4.125	5.875	8	21/32	1.313	3/4	10	0.875
3	2.000	8.250	5.000	6.625	8	21/32	1.313	3/4	10	0.875
3 1/2	2.125	9.000	5.500	7.250	8	49/64	1.438	7/8	9	1.000
4	2.125	10.750	6.188	8.500	8	49/64	1.438	7/8	9	1.000
5	2.250	13.000	7.313	10.500	8	7/8	1.563	1	8	1.125
6	2.250	14.000	8.500	11.500	12	7/8	1.563	1	8	1.125
8	2.500	16.500	10.625	13.750	12	1	1.813	1 1/8	8	1.250
10	2.750	20.000	12.750	17.000	16	1 1/8	2.125	1 1/4	8	1.438
12	2.750	22.000	15.000	19.250	20	1 1/8	2.125	1 1/4	8	1.438

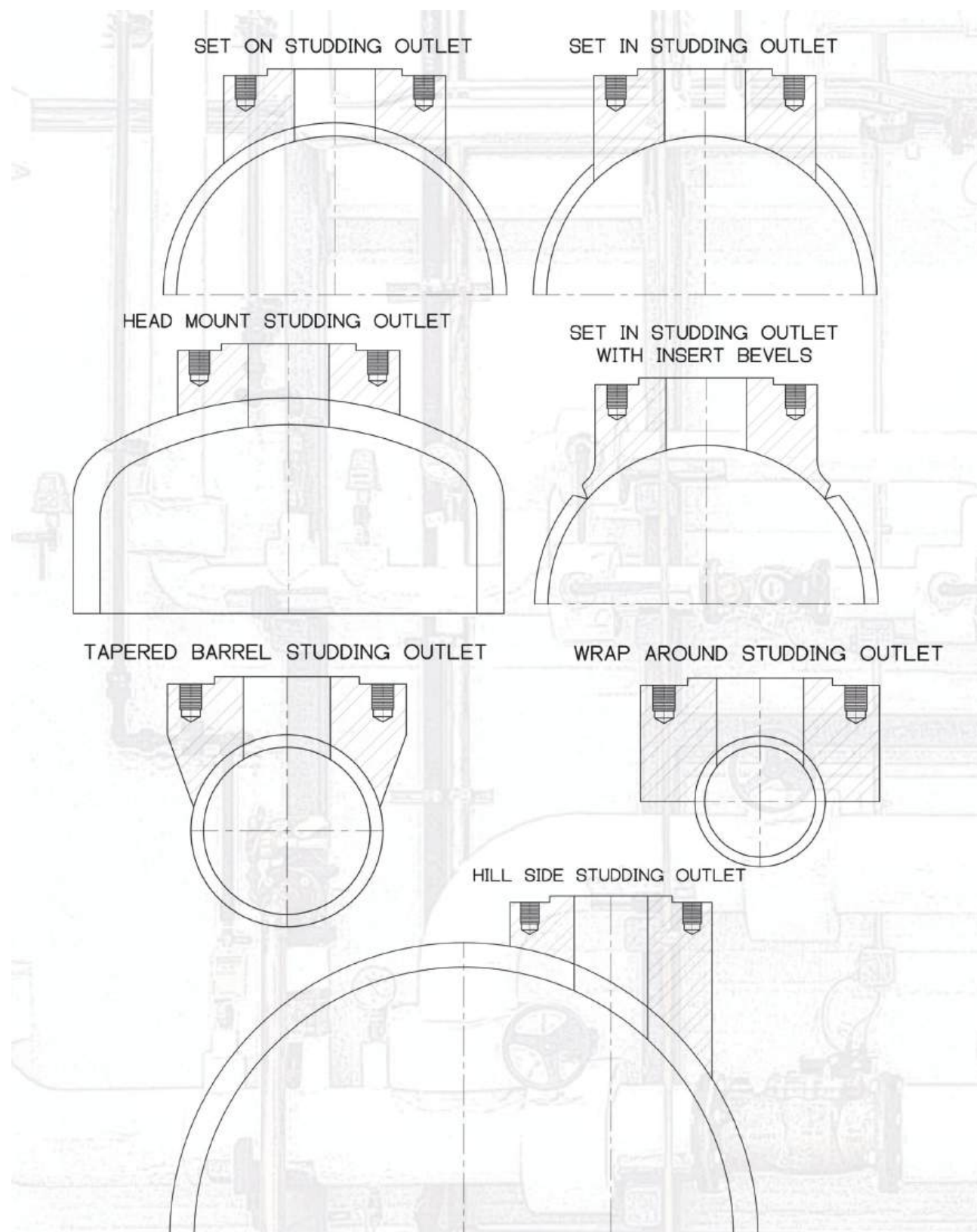
CLASS 900										
NPS (Inner Dia.)	Flange Thickness	Outer Diameter	Raised Face	Bolt Circle	No. of Holes	Hole Size	Hole Depth	STUD BOLT		
								Thrd Size	T.P.I.	Thrd Depth
1/2	2.000	4.750	1.375	3.250	4	21/32	1.313	3/4	10	0.875
3/4	2.000	5.125	1.688	3.500	4	21/32	1.313	3/4	10	0.875
1	2.125	5.875	2.000	4.000	4	49/64	1.438	7/8	9	1.000
1 1/4	2.125	6.250	2.500	4.375	4	49/64	1.438	7/8	9	1.000
1 1/2	2.250	7.000	2.875	4.875	4	7/8	1.563	1	8	1.125
2	2.125	8.500	3.625	6.500	8	49/64	1.438	7/8	9	1.000
2 1/2	2.250	9.625	4.125	7.500	8	7/8	1.563	1	8	1.125
3	2.125	9.500	5.000	7.500	8	49/64	1.438	7/8	9	1.000
4	2.500	11.500	6.188	9.250	8	1	1.813	1 1/8	8	1.250
5	2.750	13.750	7.313	11.000	8	1 1/8	2.125	1 1/4	8	1.438
6	2.500	15.000	8.500	12.500	12	1	1.813	1 1/8	8	1.250
8	3.000	18.500	10.625	15.500	12	1 1/4	2.250	1 3/8	8	1.563
10	3.000	21.500	12.750	18.500	16	1 1/4	2.250	1 3/8	8	1.563
12	3.000	24.000	15.000	21.000	20	1 1/4	2.250	1 3/8	8	1.563

CLASS 1500										
NPS (Inner Dia.)	Flange Thickness	Outer Diameter	Raised Face	Bolt Circle	No. of Holes	Hole Size	Hole Depth	STUD BOLT		
								Thrd Size	T.P.I.	Thrd Depth
1/2	2.000	4.750	1.375	3.250	4	21/32	1.313	3/4	10	0.875
3/4	2.000	5.125	1.688	3.500	4	21/32	1.313	3/4	10	0.875
1	2.125	5.875	2.000	4.000	4	49/64	1.438	7/8	9	1.000
1 1/4	2.125	6.250	2.500	4.375	4	49/64	1.438	7/8	9	1.000
1 1/2	2.250	7.000	2.875	4.875	4	7/8	1.563	1	8	1.125
2	2.125	8.500	3.625	6.500	8	49/64	1.438	7/8	9	1.000
2 1/2	2.250	9.625	4.125	7.500	8	7/8	1.563	1	8	1.125
3	2.500	10.500	5.000	8.000	8	1	1.813	1 1/8	8	1.250
4	2.750	12.250	6.188	9.500	8	1 1/8	2.125	1 1/4	8	1.438
5	3.125	14.750	7.313	11.500	8	1 3/8	2.375	1 1/2	8	1.688
6	3.000	15.500	8.500	12.500	12	1 1/4	2.250	1 3/8	8	1.563
8	3.500	19.000	10.625	15.500	12	1 1/2	2.563	1 5/8	8	1.875
10	3.875	23.000	12.750	19.000	12	1 3/4	3.000	1 7/8	8	2.125
12	4.125	26.500	15.000	22.500	16	1 7/8	3.313	2	8	2.250

CLASS 2500										
NPS (Inner Dia.)	Flange Thickness	Outer Diameter	Raised Face	Bolt Circle	No. of Holes	Hole Size	Hole Depth	STUD BOLT		
								Thrd Size	T.P.I.	Thrd Depth
1/2	2.000	5.250	1.375	3.500	4	21/32	1.313	3/4	10	0.875
3/4	2.000	5.500	1.688	3.750	4	21/32	1.313	3/4	10	0.875
1	2.125	6.250	2.000	4.250	4	49/64	1.438	7/8	9	1.000
1 1/4	2.250	7.250	2.500	5.125	4	7/8	1.563	1	8	1.125
1 1/2	2.500	8.000	2.875	5.750	4	1	1.813	1 1/8	8	1.250
2	2.250	9.250	3.625	6.750	8	7/8	1.563	1	8	1.125
2 1/2	2.500	10.500	4.125	7.750	8	1	1.813	1 1/8	8	1.250
3	2.750	12.000	5.000	9.000	8	1 1/8	2.125	1 1/4	8	1.438
4	3.250	14.000	6.188	10.750	8	1 3/8	2.375	1 1/2	8	1.688
5	3.750	16.500	7.313	12.750	8	1 5/8	2.813	1 3/4	8	2.000
6	4.125	19.000	8.500	14.500	8	1 7/8	3.313	2	8	2.250
8	4.375	21.750	10.625	17.250	12	1 7/8	3.313	2	8	2.250
10	5.125	26.500	12.750	21.250	12	2 3/8	4.000	2 1/2	8	2.813
12	5.500	30.000	15.000	24.375	12	2 5/8	4.375	2 3/4	8	3.125



VARIOUS STUDDING OUTLET CONFIGURATIONS



NOTE: STUD HOLES SHOWN OUT OF TRUE POSITION FOR ILLUSTRATION PURPOSES, STUD HOLES WILL STRADDLE CENTERLINE



MARKING DETAIL AND COMMON FNG ABBREVIATIONS

BWB BUTT WELD OUTLET
SWB SOCKET WELD OUTLET
THB THREADED OUTLET

BLB BUTT WELD LATERAL OUTLET
SLB SOCKET WELD LATERAL OUTLET
TLB THREADED LATERAL OUTLET

BEB BUTT WELD ELBOW OUTLET
SEB SOCKET WELD ELBOW OUTLET
TEB THREADED ELBOW OUTLET

BIB BUTT WELD INSERT OUTLET
SIB SOCKET WELD INSERT OUTLET
TIB THREADED INSERT OUTLET

BNB BEVELED NIPPLE OUTLET
PNB PLAIN NIPPLE OUTLET
TNB THREADED NIPPLE OUTLET

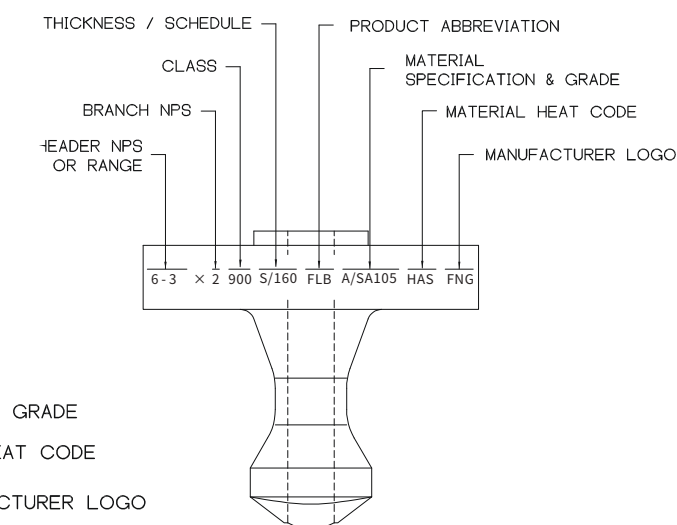
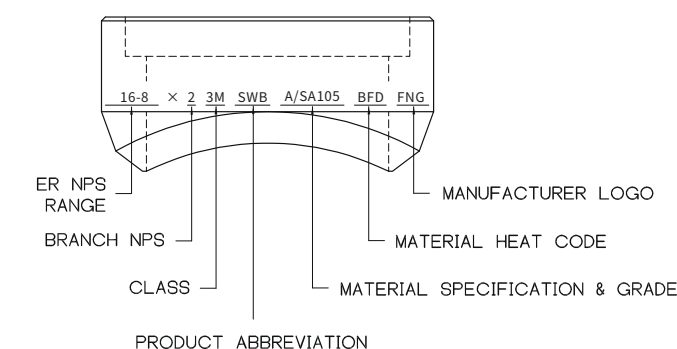
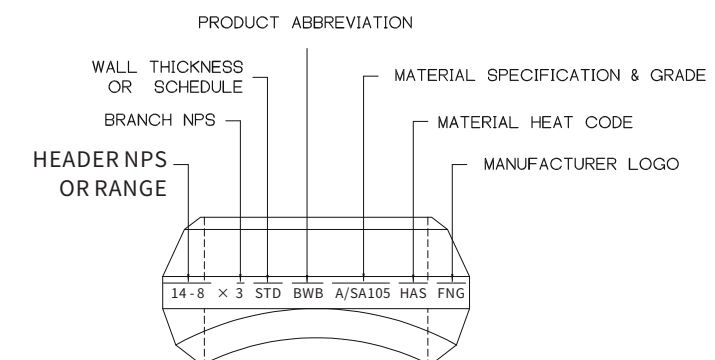
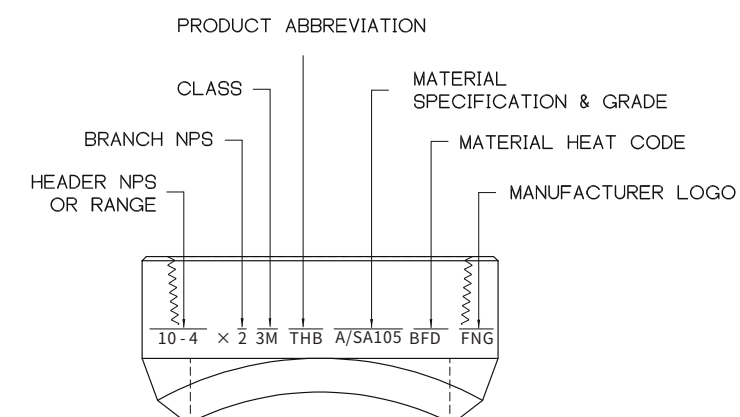
FLB FLANGED OUTLET
FIB FLANGED INSERT OUTLET

CBWB COMBINATION WELD BOSS
SWWB SOCKET WELD WELD BOSS
THWB THREADED WELD BOSS

CBCB COMBINATION COUPLET BOSS
SWCB SOCKET WELD COUPLET BOSS
THCB THREADED COUPLET BOSS

SRVIB SAFETY RELIEF VALVE INSERT OUTLET

LWV LOW WELD VOLUME





CONSOLIDATION CHART

TRUE - STRAIGHT BORE DESIGN
STAINLESS - CHROME - ALLOY BRANCHETTES®
NON-IMPRESSION DIE FORGED

SCH.10s BUTT WELD OUTLET									
1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	6
1 1/4 - 1/2	2 - 3/4	1 1/4 - 1	1 1/2 - 1 1/4	1 1/2	2	2 1/2	3	4	6
36 - 1 1/2	36 - 2 1/2	4 - 1 1/2	2 1/2 - 2	2	3 - 2 1/2	3 1/2 - 3	3 1/2	5	8
		36 - 5	6 - 3	3 - 2 1/2	5 - 3 1/2	5 - 4	4	6	10
			36 - 8	10 - 3 1/2	18 - 6	10 - 6	6 - 5	10 - 8	14 - 12
				36 - 12	36 - 20	26 - 12	14 - 8	18 - 12	18 - 16
						36 - 28	40 - 16	36 - 20	26 - 20
							84 - 42	84 - 38	42 - 28
									84 - 44
STANDARD, SCH.40s, & CL.3M BUTT WELD OUTLET & SOCKET WELD OUTLET									
1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	6
1 - 1/2	2 - 3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	6
36 - 1 1/4	36 - 2 1/2	3 1/2 - 1 1/4	2 - 1 1/2	3 - 2	3 - 2 1/2	3 1/2 - 3	4 - 3 1/2	5	8
		36 - 4	6 - 2 1/2	8 - 3 1/2	6 - 3 1/2	5 - 4	6 - 5	6	10
			36 - 8	36 - 10	16 - 8	12 - 6	14 - 8	10 - 8	14 - 12
					36 - 18	24 - 14	36 - 16	20 - 12	18 - 16
						36 - 26		64 - 22	24 - 20
								34 - 26	42 - 36
EXTRA STRONG & SCH.80s BUTT WELD OUTLET									
1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	6
3/4 - 1/2	1 1/2 - 3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	6
36 - 1	36 - 2	3 - 1 1/4	4 - 1 1/2	2 1/2 - 2	2 1/2	3 1/2 - 3	4 - 3 1/2	5	8
		36 - 3 1/2	36 - 5	8 - 3	4 - 3	6 - 4	6 - 5	6	10
				36 - 10	14 - 5	24 - 8	10 - 8	10 - 8	14 - 12
					36 - 16	36 - 26	32 - 12	22 - 12	18 - 16
							36 - 34	56 - 24	24 - 20
									34 - 26
									42 - 36

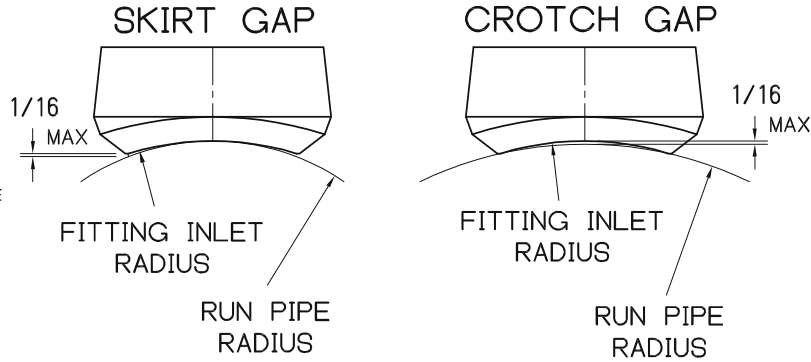
SCH.160 & CL.6M BUTT WELD & SOCKET WELD OUTLET						
1/2	3/4	1	1 1/4	1 1/2	2	
1/2	1 - 3/4	2 - 1	1 1/4	1 1/2	2	
36 - 3/4	36 - 1 1/4	36 - 2 1/2	4 - 1 1/2	6 - 3	3 - 2 1/2	
			36 - 5	36 - 8	10 - 3 1/2	
					36 - 12	
XX-STRONG & CL.9M BUTT WELD & SOCKET WELD OUTLET						
1/2	3/4	1	1 1/4	1 1/2	2	
1/2	3/4	1	1 1/2 - 1 1/4	2 1/2 - 1 1/2	2	
36 - 1/2	36 - 1	36 - 1 1/4	36 - 3	3 1/2 - 3	6 - 3	
				36 - 4	36 - 8	
CL.3M, CL.6M, & CL.10M THREADED OUTLET						
1/2	3/4	1	1 1/4	1 1/2	2	
1/2	3/4	1	1 1/2 - 1 1/4	1 1/2	2	
1 1/2 - 3/4	2 1/2 - 1	2 - 1 1/4	3 1/2 - 2	2	2 1/2	
36 - 2	36 - 3	4 - 2 1/2	8 - 4	3 1/2 - 2 1/2	4 - 3	
		36 - 5	36 - 10	10 - 4	10 - 5	
				36 - 12	18 - 12	
					36 - 20	

TRUE-STRAIGHT BORE DESIGN
CARBON STEEL A/SA105 OUTLET
IMPRESSION DIE FORGED

STANDARD BUTT WELD OUTLET								
1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4
36 - 1 1/4	36 - 2 1/2	36 - 2	36 - 8	36 - 4	36 - 8	36 - 12	36 - 16	36 - 22
1 - 1/2	2 - 3/4	3 1/2 - 1 1/4	6 - 2 1/2	3 1/2 - 2	6 - 3 1/2	10 - 5	14 - 8	20 - 12
		1	2 - 1 1/2	1 1/2	3 - 2 1/2	4 - 3	6 - 5	10 - 8
			1 1/4		2	2 1/2	4 - 3 1/2	6 - 5
							3	4
EXTRA STRONG BUTT WELD OUTLET								
1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4
36 - 1	36 - 2	36 - 2	36 - 6	36 - 4	36 - 8	36 - 12	36 - 16	36 - 22
3/4 - 1/2	1 1/2 - 3/4	3 - 1 1/4	5 - 2 1/2	3 1/2 - 2	6 - 3 1/2	10 - 5	14 - 8	20 - 12
		1	2 - 1 1/4	1 1/2	3 - 2 1/2	4 - 3	6 - 5	10 - 8
					2	2 1/2	4 - 3 1/2	6 - 5
							3	4

CL.3M SOCKET WELD OUTLET					
1/2	3/4	1	1 1/4	1 1/2	2
36 - 3/4	36 - 1 1/2	36 - 3	36 - 4	36 - 6	36 - 8
1/2	1 1/4 - 3/4	2 1/2 - 1 1/4	3 1/2 - 2	5 - 3	6 - 4
		1	1 1/2 - 1 1/4	2 1/2 - 2	3 1/2 - 2 1/2
				1 1/2	2
CL.3M THREADED OUTLET					
1/2	3/4	1	1 1/4	1 1/2	2
36 - 3/4	36 - 1 1/2	36 - 3	36 - 4	36 - 6	36 - 8
1/2	1 1/4 - 3/4	2 1/2 - 1 1/4	3 1/2 - 2	5 - 3	6 - 4
		1	1 1/2 - 1 1/4	2 1/2 - 2	3 1/2 - 2 1/2
				1 1/2	2

INTEGRALLY REINFORCED BRANCH CONNECTIONS NPS 6 INCH AND SMALLER MANUFACTURED IN ACCORDANCE WITH MSS SP-97 BY WELDING OUTLETS INC. WILL TYPICALLY BE MANUFACTURED UTILIZING A "CONSOLIDATION" DESIGN. EACH FITTING IS DESIGNED TO FIT A NUMBER OF RUN PIPE SIZES, E.G. 1" FITTING MARKED 36 - 4 WILL FIT ALL RUN PIPE SIZES FROM 4" TO 36". WHEN PLACED ON A 36" RUN PIPE, THERE WILL BE A MAXIMUM RADIAL GAP OF 1/16" BETWEEN THE TOP OF THE RUN PIPE AND THE BASE OF THE FITTING AT THE CROTCH. ACCORDING TO MSS SP-97 PARAGRAPH 3.3: THE MANUFACTURER HAS THE OPTION TO CONSOLIDATE RUN SIZES FOR A GIVEN BRANCH FOR ECONOMIC REASONS, PROVIDED THE DESIGNATED CONSOLIDATION GAP DISTANCE BETWEEN THE RUN PIPE RADIUS AND THE FITTING INLET RADIUS DOES NOT EXCEED 1/16".



PIPE SIZES AND SCHEDULES

NPS	OD	PIPE SCHEDULE														
		5	10s	10	20	30	STD	40	60	XS	80	100	120	140	160	XXS
1/8	0.405		0.049 0.307	0.049 0.307		0.057 0.291	0.068 0.269	0.068 0.269		0.095 0.215	0.095 0.215					
1/4	0.540		0.065 0.410	0.065 0.410		0.073 0.394	0.088 0.364	0.088 0.364		0.119 0.302	0.119 0.302					
3/8	0.675		0.065 0.545	0.065 0.545		0.073 0.529	0.091 0.493	0.091 0.493		0.126 0.423	0.126 0.423					
1/2	0.840	0.065 0.710	0.083 0.674	0.083 0.674		0.095 0.650	0.109 0.622	0.109 0.622		0.147 0.546	0.147 0.546				0.188 0.464	0.294 0.252
3/4	1.050	0.065 0.920	0.083 0.884	0.083 0.884		0.095 0.860	0.113 0.824	0.113 0.824		0.154 0.742	0.154 0.742				0.219 0.612	0.308 0.434
1	1.315	0.065 1.185	0.109 1.097	0.109 1.097		0.114 1.087	0.133 1.049	0.133 1.049		0.179 0.957	0.179 0.957				0.250 0.815	0.358 0.599
1-1/4	1.660	0.065 1.530	0.109 1.442	0.109 1.442		0.117 1.426	0.140 1.380	0.140 1.380		0.191 1.278	0.191 1.278				0.250 1.160	0.382 0.896
1-1/2	1.900	0.065 1.770	0.109 1.682	0.109 1.682		0.125 1.650	0.145 1.610	0.145 1.610		0.200 1.500	0.200 1.500				0.281 1.338	0.400 1.100
2	2.375	0.065 2.245	0.109 2.157	0.109 2.157		0.125 2.125	0.154 2.067	0.154 2.067		0.218 1.939	0.218 1.939				0.344 1.687	0.436 1.503
2-1/2	2.875	0.083 2.709	0.120 2.635	0.120 2.635		0.188 2.499	0.203 2.469	0.203 2.469		0.276 2.323	0.276 2.323				0.375 2.125	0.552 1.771
3	3.500	0.083 3.334	0.120 3.260	0.120 3.260		0.188 3.124	0.216 3.068	0.216 3.068		0.300 2.900	0.300 2.900				0.438 2.624	0.600 2.300
3-1/2	4.000	0.083 3.834	0.120 3.760	0.120 3.760		0.188 3.624	0.226 3.548	0.226 3.548		0.318 3.364	0.318 3.364					
4	4.500	0.083 4.334	0.120 4.260	0.120 4.260		0.188 4.124	0.237 4.026	0.237 4.026		0.337 3.826	0.337 3.826		0.438 3.624		0.531 3.438	0.674 3.152
5	5.563	0.109 5.345	0.134 5.295	0.134 5.295			0.258 5.047	0.258 5.047		0.375 4.813	0.375 4.813		0.500 4.563		0.625 4.313	0.750 4.063
6	6.625	0.109 6.407	0.134 6.357	0.134 6.357			0.280 6.065	0.280 6.065		0.432 5.761	0.432 5.761		0.562 5.501		0.719 5.187	0.864 4.897
8	8.625	0.109 8.407	0.148 8.329	0.148 8.329	0.250 8.125	0.277 8.071	0.322 7.981	0.322 7.981	0.406 7.813	0.500 7.625	0.500 7.625	0.594 7.437	0.719 7.187	0.812 7.001	0.906 6.813	0.875 6.875
10	10.75	0.134 10.482	0.165 10.420	0.165 10.420	0.250 10.250	0.307 10.136	0.365 10.020	0.365 10.020	0.500 9.750	0.500 9.750	0.594 9.562	0.719 9.312	0.844 9.062	1.000 8.750	1.125 8.500	1.000 8.750
12	12.75	0.156 12.438	0.180 12.390	0.180 12.390	0.250 12.250	0.330 12.090	0.375 12.000	0.406 11.938	0.562 11.626	0.500 11.750	0.688 11.374	0.844 11.062	1.000 10.750	1.125 10.500	1.312 10.126	1.000 10.750
14	14.0	0.156 13.688	0.188 13.624	0.250 13.500	0.312 13.376	0.375 13.250	0.375 13.250	0.438 13.124	0.594 12.812	0.500 13.000	0.750 12.500	0.938 12.124	1.094 11.812	1.250 11.500	1.406 11.188	
16	16.0	0.165 15.670	0.188 15.624	0.250 15.500	0.312 15.376	0.375 15.250	0.375 15.250	0.500 15.000	0.656 14.688	0.500 15.000	0.844 14.312	1.031 13.938	1.219 13.562	1.438 13.124	1.594 12.812	
18	18.0	0.165 17.670	0.188 17.624	0.250 17.500	0.312 17.376	0.438 17.124	0.375 17.250	0.562 16.876	0.750 16.500	0.500 17.000	0.938 16.124	1.156 15.688	1.375 15.250	1.562 14.876	1.781 14.438	
20	20.0	0.188 19.624	0.218 19.564	0.250 19.500	0.375 19.250	0.500 19.000	0.375 19.250	0.594 18.812	0.812 18.376	0.500 19.000	1.031 17.938	1.281 17.438	1.500 17.000	1.750 16.500	1.969 16.062	
22	22.0	0.188 21.624	0.218 21.564	0.250 21.500	0.375 21.250	0.500 21.000	0.375 21.250		0.875 20.250	0.500 21.000	1.125 19.750	1.375 19.250	1.625 18.750	1.875 18.250	2.125 17.750	
24	24.0	0.218 23.564	0.250 23.500	0.250 23.500	0.375 23.250	0.562 22.876	0.375 23.250	0.688 22.624	0.969 22.062	0.500 23.000	1.219 21.562	1.531 20.938	1.812 20.376	2.062 19.876	2.344 19.312	
34	34.0			0.312 33.376	0.500 33.000	0.625 32.750	0.375 33.250	0.688 32.624		0.500 33.000						
36	36.0			0.312 35.376	0.500 35.000	0.625 34.750	0.375 35.250	0.750 34.500		0.500 35.000						
42	42.0						0.375 41.250			0.500 41.000						
48	48.0						0.375 47.250			0.500 47.000						



PIPE SIZES AND SCHEDULES

NPS	OD	PIPE SCHEDULE														
		5	10s	10	20	30	STD	40	60	XS	80	100	120	140	160	XXS
1/8	0.405		0.049	0.049		0.057	0.068	0.068		0.095	0.095					
			0.307	0.307		0.291	0.269	0.269		0.215	0.215					
1/4	0.540		0.065	0.065		0.073	0.088	0.088		0.119	0.119					
			0.410	0.410		0.394	0.364	0.364		0.302	0.302					
3/8	0.675		0.065	0.065		0.073	0.091	0.091		0.126	0.126					
			0.545	0.545		0.529	0.493	0.493		0.423	0.423					
1/2	0.840	0.065	0.083	0.083		0.095	0.109	0.109		0.147	0.147				0.188	0.294
		0.710	0.674	0.674		0.650	0.622	0.622		0.546	0.546				0.464	0.252
3/4	1.050	0.065	0.083	0.083		0.095	0.113	0.113		0.154	0.154				0.219	0.308
		0.920	0.884	0.884		0.860	0.824	0.824		0.742	0.742				0.612	0.434
1	1.315	0.065	0.109	0.109		0.114	0.133	0.133		0.179	0.179				0.250	0.358
		1.185	1.097	1.097		1.087	1.049	1.049		0.957	0.957				0.815	0.599
1-1/4	1.660	0.065	0.109	0.109		0.117	0.140	0.140		0.191	0.191				0.250	0.382
		1.530	1.442	1.442		1.426	1.380	1.380		1.278	1.278				1.160	0.896
1-1/2	1.900	0.065	0.109	0.109		0.125	0.145	0.145		0.200	0.200				0.281	0.400
		1.770	1.682	1.682		1.650	1.610	1.610		1.500	1.500				1.338	1.100
2	2.375	0.065	0.109	0.109		0.125	0.154	0.154		0.218	0.218				0.344	0.436
		2.245	2.157	2.157		2.125	2.067	2.067		1.939	1.939				1.687	1.503
2-1/2	2.875	0.083	0.120	0.120		0.188	0.203	0.203		0.276	0.276				0.375	0.552
		2.709	2.635	2.635		2.499	2.469	2.469		2.323	2.323				2.125	1.771
3	3.500	0.083	0.120	0.120		0.188	0.216	0.216		0.300	0.300				0.438	0.600
		3.334	3.260	3.260		3.124	3.068	3.068		2.900	2.900				2.624	2.300
3-1/2	4.000	0.083	0.120	0.120		0.188	0.226	0.226		0.318	0.318					
		3.834	3.760	3.760		3.624	3.548	3.548		3.364	3.364					
4	4.500	0.083	0.120	0.120		0.188	0.237	0.237		0.337	0.337		0.438		0.531	0.674
		4.334	4.260	4.260		4.124	4.026	4.026		3.826	3.826		3.624		3.438	3.152
5	5.563	0.109	0.134	0.134			0.258	0.258		0.375	0.375		0.500		0.625	0.750
		5.345	5.295	5.295			5.047	5.047		4.813	4.813		4.563		4.313	4.063
6	6.625	0.109	0.134	0.134			0.280	0.280		0.432	0.432		0.562		0.719	0.864
		6.407	6.357	6.357			6.065	6.065		5.761	5.761		5.501		5.187	4.897
8	8.625	0.109	0.148	0.148	0.250	0.277	0.322	0.322	0.406	0.500	0.500	0.594	0.719	0.812	0.906	0.875
		8.407	8.329	8.329	8.125	8.071	7.981	7.981	7.813	7.625	7.625	7.437	7.187	7.001	6.813	6.875
10	10.75	0.134	0.165	0.165	0.250	0.307	0.365	0.365	0.500	0.500	0.594	0.719	0.844	1.000	1.125	1.000
		10.482	10.420	10.420	10.250	10.136	10.020	10.020	9.750	9.562	9.312	9.062	8.750	8.500	8.500	8.750
12	12.75	0.156	0.180	0.180	0.250	0.330	0.375	0.406	0.562	0.500	0.688	0.844	1.000	1.125	1.312	1.000
		12.438	12.390	12.390	12.250	12.090	12.000	11.938	11.626	11.750	11.374	11.062	10.750	10.500	10.126	10.750
14	14.0	0.156	0.188	0.250	0.312	0.375	0.375	0.438	0.594	0.500	0.750	0.938	1.094	1.250	1.406	
		13.688	13.624	13.500	13.376	13.250	13.250	13.124	12.812	13.000	12.500	12.124	11.812	11.500	11.188	
16	16.0	0.165	0.188	0.250	0.312	0.375	0.375	0.500	0.656	0.500	0.844	1.031	1.219	1.438	1.594	
		15.670	15.624	15.500	15.376	15.250	15.000	14.688	15.000	14.312	13.938	13.562	13.124	12.812		
18	18.0	0.165	0.188	0.250	0.312	0.438	0.375	0.562	0.750	0.500	0.938	1.156	1.375	1.562	1.781	
		17.670	17.624	17.500	17.376	17.124	17.250	16.876	16.500	17.000	16.124	15.688	15.250	14.876	14.438	
20	20.0	0.188	0.218	0.250	0.375	0.500	0.375	0.594	0.812	0.500	1.031	1.281	1.500	1.750	1.969	
		19.624	19.564	19.500	19.250	19.000	19.250	18.812	18.376	19.000	17.938	17.438	17.000	16.500	16.062	
22	22.0	0.188	0.218	0.250	0.375	0.500	0.375		0.875	0.500	1.125	1.375	1.625	1.875	2.125	
		21.624	21.564	21.500	21.250	21.000	21.250		20.250	21.000	19.750	19.250	18.750	18.250	17.750	
24	24.0	0.218	0.250	0.250	0.375	0.562	0.375	0.688	0.969	0.500	1.219	1.531	1.812	2.062	2.344	
		23.564	23.500	23.500	23.250	22.876	23.250	22.624	22.062	23.000	21.562	20.938	20.376	19.876	19.312	
34	34.0			0.312	0.500	0.625	0.375	0.688		0.500						
				33.376	33.000	32.750	33.250	32.624		33.000						
36	36.0			0.312	0.500	0.625	0.375	0.750		0.500						
				35.376	35.000	34.750	35.250	34.500		35.000						
42	42.0						0.375			0.500						
							41.250			41.000						
48	48.0						0.375			0.500						
							47.250			47.000						

1. For reference only.
2. Values are in accordance with ASME B36.10M, unless specified otherwise.
3. Sch.10s Values are in accordance with ASME B36.19M.
4. Nominal (Average) Wall and the corresponding inner diameter are listed.



Pipe Nominal (Average) Wall Thickness

NPS	OD	PIPE SCHEDULE														
		5	10s	10	20	30	STD	40	60	XS	80	100	120	140	160	XXS
1/8	0.405		0.049	0.049		0.057	0.068	0.068		0.095	0.095					
1/4	0.540		0.065	0.065		0.073	0.088	0.088		0.119	0.119					
3/8	0.675		0.065	0.065		0.073	0.091	0.091		0.126	0.126					
1/2	0.840	0.065	0.083	0.083		0.095	0.109	0.109		0.147	0.147				0.188	0.294
3/4	1.050	0.065	0.083	0.083		0.095	0.113	0.113		0.154	0.154				0.219	0.308
1	1.315	0.065	0.109	0.109		0.114	0.133	0.133		0.179	0.179				0.250	0.358
1-1/4	1.660	0.065	0.109	0.109		0.117	0.140	0.140		0.191	0.191				0.250	0.382
1-1/2	1.900	0.065	0.109	0.109		0.125	0.145	0.145		0.200	0.200				0.281	0.400
2	2.375	0.065	0.109	0.109		0.125	0.154	0.154		0.218	0.218				0.344	0.436
2-1/2	2.875	0.083	0.120	0.120		0.188	0.203	0.203		0.276	0.276				0.375	0.552
3	3.500	0.083	0.120	0.120		0.188	0.216	0.216		0.300	0.300				0.438	0.600
3-1/2	4.000	0.083	0.120	0.120		0.188	0.226	0.226		0.318	0.318					
4	4.500	0.083	0.120	0.120		0.188	0.237	0.237		0.337	0.337		0.438		0.531	0.674
5	5.563	0.109	0.134	0.134			0.258	0.258		0.375	0.375		0.500		0.625	0.750
6	6.625	0.109	0.134	0.134			0.280	0.280		0.432	0.432		0.562		0.719	0.864
8	8.625	0.109	0.148	0.148	0.250	0.277	0.322	0.322	0.406	0.500	0.500	0.594	0.719	0.812	0.906	0.875
10	10.75	0.134	0.165	0.165	0.250	0.307	0.365	0.365	0.500	0.500	0.594	0.719	0.844	1.000	1.125	1.000
12	12.75	0.156	0.180	0.180	0.250	0.330	0.375	0.406	0.562	0.500	0.688	0.844	1.000	1.125	1.312	1.000
14	14.0	0.156	0.188	0.250	0.312	0.375	0.375	0.438	0.594	0.500	0.750	0.938	1.094	1.250	1.406	
16	16.0	0.165	0.188	0.250	0.312	0.375	0.375	0.500	0.656	0.500	0.844	1.031	1.219	1.438	1.594	
18	18.0	0.165	0.188	0.250	0.312	0.438	0.375	0.562	0.750	0.500	0.938	1.156	1.375	1.562	1.781	
20	20.0	0.188	0.218	0.250	0.375	0.500	0.375	0.594	0.812	0.500	1.031	1.281	1.500	1.750	1.969	
22	22.0	0.188	0.218	0.250	0.375	0.500	0.375		0.875	0.500	1.125	1.375	1.625	1.875	2.125	
24	24.0	0.218	0.250	0.250	0.375	0.562	0.375	0.688	0.969	0.500	1.219	1.531	1.812	2.062	2.344	
34	34.0			0.312	0.500	0.625	0.375	0.688		0.500						
36	36.0			0.312	0.500	0.625	0.375	0.750		0.500						
42	42.0						0.375			0.500						
48	48.0						0.375			0.500						



MATERIAL SPECIFICATIONS SHEET

IDENTIFICATION SYMBOL	UNS#	BAR	FORGINGS	WELD FITTINGS	PIPE	PLATE	ASME WELD CLASSIFICATION
Austenitic Stainless							
304	S30400	A276/479	A182	A403WP	A312	A240	P8
304H	S30409	A276/479	A182	A403WP	A312	A240	P8
304L	S30403	A276/479	A182	A403WP	A312	A240	P8
316	S31600	A276/479	A182	A403WP	A312	A240	P8
316H	S31609	A276/479	A182	A403WP	A312	A240	P8
316L	S31603	A276/479	A182	A403WP	A312	A240	P8
317L	S31703	A279/479	A182	A403WP	A312	A240	P8
321	S32100	A276/479	A182	A403WP	A312	A240	P8
321H	S32109	A276/479	A182	A403WP	A312	A240	P8
347	S34700	A276/479	A182	A403WP	A312	A240	P8
347H	S34709	A276/479	A182	A403WP	A312	A240	P8
F44 (254SMO)	S31254	A276/479	A182	A403WP	A312	A240	P8
Ferritic-Austenitic Stainless							
F51 (DUPLEX)	S31803	A276/479	A182	A182/A815WP	A790	A240	P10H
F53 (SUPER DUPLEX)	S32750	A479	A182	A182/A815WP	A790	A240	P10H
F55 (ZERON 100)	S32760	A276	A182	A182/A815WP	A790	A240	S-10H
F60	S32205	A276	A182	A182/A815WP	A790	A240	
Low Alloy Steels							
F5	K41545	A182	A182	A234	A335	A387	P5B
F9	K90941	A182	A182	A234	A335	A387	P5B
F91	K90901	A182	A182	A234	A335	A387	P5B
F11 Class 1	K11597	A182	A182	A234	A335	A387	P4
F11 Class 2 & 3	K11572	A182	A182	A234	A335	A387	P4
F22 Class 1 & 3	K21590	A182	A182	A234	A335	A387	P5A
Carbon-Steel		A105/A695	A105	A234	A106	A516	P1
Low-Temperature Steel		A350-LF2 CL1	A350-LF2 CL1	A420WPL6	A333GR6		P1
High Strength Transmission Service			A694F42 - F70	A860 / SP-75	A381 / API-5L		S-1
Nickel-Alloys							
Nickel-200	N02200	B160	B564	B366 WPN	B161	B162	P41
Alloy-400	N04400	B164	B564	B366 WPNC	B165	B127	P42
Alloy-600	N06600	B166	B564	B366 WPNC1	B167/B516	B168	P43
Alloy-625	N06625	B466	B564	B366 WPNCMC	B444	B443	P43
Alloy-800H	N08810	B408	B564	B366 WPNICIO	B407	B409	P45
Alloy-800HT	N08811	B408	B564	B366 WPNICII	B407	B409	P45
Alloy-825	N08825	B425	B564	B366 WPNICMC	B423	B424	P45
Corrosive High-Temp. Service							
A20	N08020	B473	B462	B366 WP20CB	B729	B463	P45
6 Moly-AL6XN	N08367	B691	B462	B366 WP6XN	B690	B688/A240	P45
C276	N10276	B574	B564/B462	B366 WPHC276	B619/B622	B575	P44
HAST-B2	N10665	B335	B564/B462	B366 WPHB-2	B619/B622	B333	P44
C-22	N06022	B574	B564/B462	B366 WPHC22	B619/B622	B575	P44
Titanium							
Grade 2	R50400	B348	B381 F2	B363 WPT2	B338	B265	P51
Grade 7	R52400	B348	B381 F7	B363 WPT7	B338	B265	P51
Copper - Nickel							
70-30 (MIL-STD)	C71500	Reference MIL-C & MIL-F Standards					P34
90-10 (MIL-STD)	C70600						P34
Cr-Mo Alloy Steel							
4130	G41300	A29 / A322	A711	A322	A519	A829	