

PIPE FITTINGS



W
WARD MANUFACTURING



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THE WARD STORY

Ward Manufacturing, Inc. was founded in Blossburg, PA by Mr. Joseph P. Ward in 1924.

Beginning in a modest fashion with approximately thirty employees, a small line of cast iron steam and drainage fittings were manufactured along with cast iron plugs and bushings.

In the following four years a rapidly increasing demand for Ward products was experienced. Accordingly, in 1928, the manufacturing facilities were doubled in size and cast iron steam fittings and the drainage fittings product lines were expanded to include the 4" size. At the same time class 150 malleable fittings were introduced in sizes ranging from 1/8" through 4".

During the next decade Ward continued to grow in size and stature and became an increasingly important factor in the American pipe fittings industry.

Further expansion was completed in 1938 with the addition of a facility to produce malleable iron pipe unions. These products, the "W & K" unions, were an immediate success and assumed a prominent position in Ward's product offering.

Continued growth and the ever increasing demand for competitively priced products called for higher volume and more efficient molding facilities. To satisfy this business pressure, a totally new and highly automated foundry was erected in 1955 and, to this day, through careful maintenance, continuous improvement, and reinvestment, this facility is equipped with the most modern automatic molding equipment available.

May 1980 marked another major milestone in Ward's history. Beginning with class 300 malleable fittings, a series of new product offerings were introduced into the Ward line including class 300 brass-to-brass seated unions, beam clamps, C-clamps, Wardlox plain end fittings, and Couplox grooved end fittings. 1990, the Teelox mechanical branch connector, meter swivels and ferrules, connecting nuts and a revolutionary new product called Wardflex, which is corrugated stainless steel interior gas piping, were added to Ward's catalog. These additions support our commitment to respond to the need of our customers.

Ward distributes their products utilizing manufacturers' representative groups in 50 states and Canada as well as off-shore countries.

Since 1924 Ward has strived to maintain a leadership role in the manufacture and distribution of piping components. We do this by striving first to meet our customers' expectations for high quality, competitively priced and promptly delivered products. We intend to continue with this philosophy.

STANDARD MALLEABLE PIPE FITTINGS
CLASS 150

Ward Class 150 Malleable Iron Fittings are made with the most sophisticated metallurgical and processing controls available. Iron samples are continuously analyzed using spectroscopy to confirm the material quality. This sophisticated chemical analysis is complemented by rigorous quality control of incoming raw materials and iron processing. The final casting produced by this detailed attention to quality is a close-grained, high strength, non-porous iron.

Quality iron is the starting point for Ward fittings. From this iron, accurate threads are machined that comply with the precise standards developed by the American National Standards Institute (ANSI). The threads have an accurate form, thread length and straightness to allow them to easily engage threaded pipe. In addition, Ward fittings have a chamfered opening to allow faster and easier pipe engagement. This feature also protects the fitting threads from damage during handling.

All Ward black & galvanized Class 150 Malleable Iron Fittings having outlets ranging from 1/2" through 4" are air tested at 80 psig. This test is part of a constant program to maintain the highest quality fittings available.



PRESSURE - TEMPERATURE RATINGS

TEMP F	PSIG
-20 TO 150	300
200	265
250	225
300	185
350	150
366	150

GENERAL DIMENSIONS / IN INCHES

THESE DIMENSIONS APPLY TO ALL STANDARD MALLEABLE BANDED FITTINGS, BOTH STRAIGHT AND REDUCING. LENGTH OF THREAD ALSO APPLIES TO PLAIN FITTINGS. FOR CENTER-TO-FACE DIMENSIONS, SEE FITTINGS TABLES.

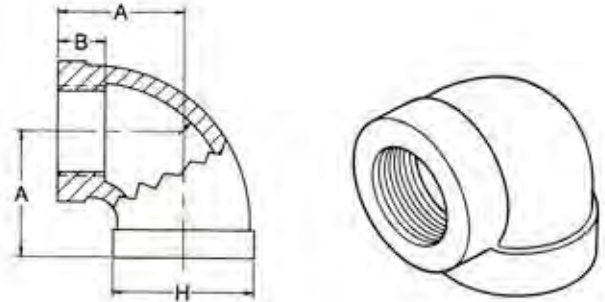
Pipe size	O.D. of Band (min)	Thread Length (min)
1/8"	0.69	0.25
1/4"	0.84	0.32
3/8"	1.01	0.36
1/2"	1.20	0.43
3/4"	1.46	0.50
1"	1.77	0.58
1 1/4"	2.15	0.67
1 1/2"	2.43	0.70
2"	2.96	0.75
2 1/2"	3.59	0.92
3"	4.28	0.98
3 1/2"	4.84	1.03
4"	5.40	1.08

Material: ASTM A197
 Dimensions: ANSI/ASME B 16.3
 ANSI/ASME B 1.20.1
 Pressure Ratings: ANSI/ASME B 16.3
 Coatings: ASTM A 153
 Additional Specifications: Federal Spec. WWP 521
 UL, ULC AND FM, as applicable.

MALLEABLE IRON 90° ELLS CLASS 150

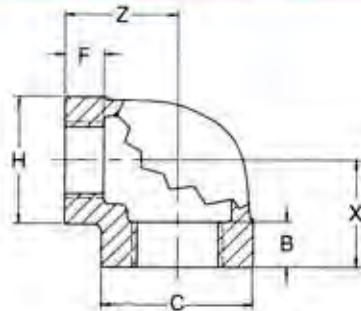
FIGURE 47

NPS	Center to End A	Outside Dia. of Band H (min)	Take Out Dimension	Length of Threads B (min)
1/8"	0.690	0.690	0.440	0.250
1/4"	0.810	0.840	0.435	0.320
3/8"	0.950	1.010	0.575	0.360
1/2"	1.120	1.200	0.620	0.430
3/4"	1.310	1.460	0.748	0.500
1"	1.500	1.770	0.813	0.580
1 1/4"	1.750	2.150	1.063	0.670
1 1/2"	1.940	2.430	1.253	0.700
2"	2.250	2.960	1.500	0.750
2 1/2"	2.700	3.590	1.333	0.920
3"	3.080	4.280	2.080	0.980
4"	3.790	5.400	2.665	1.080



MALLEABLE IRON REDUCING 90° ELLS CLASS 150

FIGURE 47

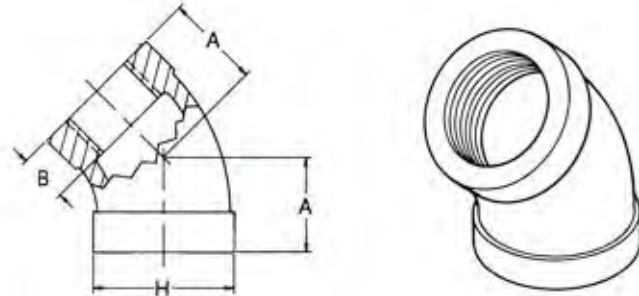


NPS	Center to End X	Center to End Z	Outside Dia. of Band C (min)	Outside Dia. of Band H (min)	Length of Thread B (min)	Length of Thread F (min)	Take Out	Take Out
1/4 x 1/8"	0.740	0.760	0.840	0.690	0.320	0.250	0.420	0.510
3/8 x 1/4"	0.880	0.900	1.010	0.840	0.360	0.320	0.505	0.385
1/2 x 3/8"	1.040	1.030	1.200	1.010	0.430	0.360	0.540	0.655
1/2 x 1/4"	0.970	0.980	1.200	0.840	0.430	0.320	0.470	0.605
3/4 x 1/2"	1.200	1.220	1.460	1.200	0.500	0.430	0.638	0.720
3/4 x 3/8"	1.120	1.130	1.460	1.010	0.500	0.360	0.558	0.755
1 x 3/4"	1.370	1.450	1.770	1.460	0.580	0.500	0.683	0.888
1 x 1/2"	1.260	1.360	1.770	1.200	0.580	0.430	0.573	0.860
1 x 3/8"	1.180	1.270	1.770	1.010	0.580	0.360	0.492	0.895
1 1/4 x 1"	1.580	1.670	2.150	1.770	0.670	0.580	0.893	0.983
1 1/4 x 3/4"	1.450	1.620	2.150	1.460	0.670	0.500	0.763	1.058
1 1/4 x 1/2"	1.340	1.530	2.150	1.200	0.670	0.430	0.653	1.030
1 1/2 x 1 1/4"	1.820	1.880	2.430	2.150	0.700	0.670	1.133	1.193
1 1/2 x 1"	1.650	1.800	2.430	1.770	0.700	0.580	0.963	1.113
1 1/2 x 3/4"	1.520	1.750	2.430	1.460	0.700	0.500	0.833	1.188
1 1/2 x 1/2"	1.410	1.660	2.430	1.200	0.700	0.430	0.723	1.160
2 x 1 1/2"	2.020	2.160	2.960	2.430	0.750	0.700	1.270	1.473
2 x 1 1/4"	1.900	2.100	2.960	2.150	0.750	0.670	1.150	1.413
2 x 1"	1.730	2.020	2.960	1.770	0.750	0.580	0.980	1.333
2 x 3/4"	1.600	1.970	2.960	1.460	0.750	0.500	0.850	1.408
2 x 1/2"	1.490	1.880	2.960	1.200	0.750	0.430	0.740	1.380
2 1/2 x 2"	2.390	2.600	3.590	2.960	0.920	0.750	1.453	1.850
2 1/2 x 1 1/2"	2.160	2.510	3.590	2.430	0.920	0.700	1.223	1.823
3 x 2"	2.520	2.890	4.280	2.960	0.980	0.750	1.520	2.140

MALLEABLE IRON 45° ELLS CLASS 150

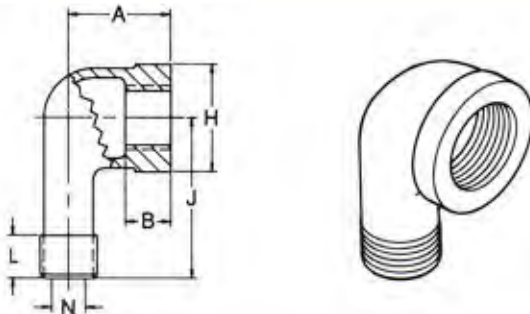
FIGURE 48

NPS	Center to End A	Outside Dia. of Band H (min)	Take Out	Length of Thread B (min)
1/4"	0.730	0.840	0.425	0.320
3/8"	0.800	1.010	0.425	0.360
1/2"	0.880	1.200	0.380	0.430
3/4"	0.980	1.460	0.418	0.500
1"	1.120	1.770	0.433	0.580
1 1/4"	1.290	2.150	0.603	0.670
1 1/2"	1.430	2.430	0.743	0.700
2"	1.680	2.960	0.930	0.750
2 1/2"	1.950	3.590	1.013	0.920
3"	2.170	4.280	1.170	0.980
4"	2.610	5.400	1.485	1.080



MALLEABLE IRON STREET 90° ELLS CLASS 150

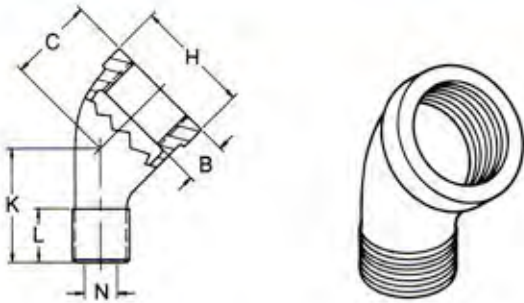
FIGURE 50



NPS	Center to Male J	Center to End A	Take Out Male End	Take Out Female End	Length of Thread B (min)	Outside Dia. Band H (min)	Length of External Thds L (min)	Port Dia. Male End N (max)
1/8"	1.000	0.690	0.750	0.440	0.250	0.690	0.260	0.200
1/4"	1.190	0.810	0.815	0.435	0.320	0.840	0.400	0.260
3/8"	1.440	0.950	1.065	0.575	0.360	1.010	0.410	0.370
1/2"	1.630	1.120	1.130	0.620	0.430	1.200	0.530	0.510
3/4"	1.890	1.310	1.328	0.748	0.500	1.460	0.550	0.690
1"	2.140	1.500	1.453	0.813	0.580	1.770	0.680	0.910
1 1/4"	2.450	1.750	1.763	1.063	0.670	2.150	0.710	1.190
1 1/2"	2.690	1.940	2.003	1.253	0.700	2.430	0.720	1.390
1 1/2 x 1 1/4"	2.625	1.810	1.938	1.123	0.700	2.430	0.710	1.190
2"	3.260	2.250	2.510	1.500	0.750	2.960	0.760	1.790
2 1/2"	3.860	2.700	2.923	1.763	0.920	3.590	1.140	2.200
3"	4.150	3.080	3.150	2.080	0.980	4.280	1.200	2.780

MALLEABLE IRON STREET 45° ELLS CLASS 150

FIGURE 51

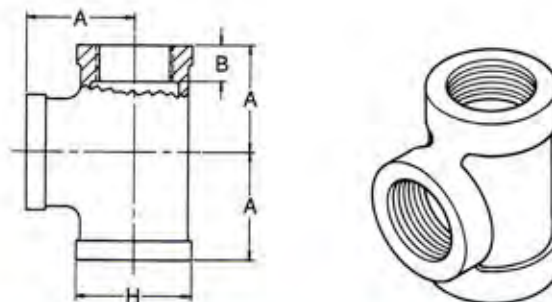


NPS	Center to End C	Center to Male End K	Take Out Female End	Take Out Male End	Length of Internal Thread B (min)	Length of External Thread L (min)	Max Port Dia. of Male End N	Outside Dia. of Band H (min)
1/8"	0.700	0.900	0.440	0.550	0.250	0.260	0.200	0.690
3/8"	0.800	1.030	0.425	0.655	0.360	0.430	0.370	1.010
1/2"	0.880	1.150	0.380	0.650	0.430	0.530	0.510	1.200
3/4"	0.980	1.290	0.418	0.728	0.500	0.550	0.690	1.460
1"	1.120	1.470	0.433	0.783	0.580	0.680	0.910	1.770
1 1/4"	1.290	1.710	0.603	1.023	0.670	0.710	1.190	2.150
1 1/2"	1.430	1.880	0.743	1.193	0.700	0.720	1.390	2.430
2"	1.680	2.220	0.930	1.470	0.750	0.760	1.790	2.960

MALLEABLE IRON TEES STRAIGHT CLASS 150

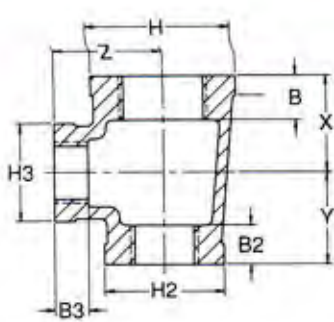
FIGURE 52

NPS	Center to End A	Length of Threads B (min)	Take Out	Outside Dia. of Band H (min)
1/8"	0.690	0.250	0.565	0.690
1/4"	0.810	0.320	0.435	0.840
3/8"	0.950	0.360	0.575	1.010
1/2"	1.120	0.430	0.620	1.200
3/4"	1.310	0.500	0.748	1.460
1"	1.500	0.580	0.813	1.770
1 1/4"	1.750	0.670	1.063	2.150
1 1/2"	1.940	0.700	1.253	2.430
2"	2.250	0.750	1.500	2.960
2 1/2"	2.700	0.920	1.763	3.590
3"	3.080	0.980	2.080	4.280
4"	3.790	1.080	2.665	5.400



MALLEABLE IRON REDUCING TEES CLASS 150

FIGURE 52



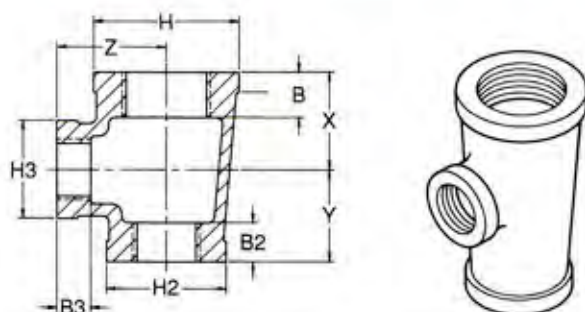
NPS	Center to End X	Center to End Y	Center to End Z	Length of Thread B	Length of Thread B2	Length of Thread B3	Take Out	Take Out	Take Out	Outside Dia. of Band H (min)	Outside Dia. of Band H2 (min)	Outside Dia. of Band H3 (min)
3/8 x 3/8 x 1/2"	1.030	1.030	1.040	0.360	0.360	0.430	0.655	0.655	0.540	1.010	1.010	1.200
1/2 x 1/4 x 1/2"	1.120	1.010	1.120	0.470	0.360	0.470	0.650	0.650	0.650	1.200	0.840	1.200
1/2 x 1/2 x 3/4"	1.220	1.220	1.200	0.430	0.430	0.500	0.720	0.720	0.638	1.200	1.200	1.460
1/2 x 1/2 x 3/8"	1.040	1.040	1.030	0.430	0.430	0.360	0.540	0.540	0.655	1.200	1.200	1.010
1/2 x 1/2 x 1/4"	0.970	0.970	0.980	0.430	0.430	0.320	0.470	0.470	0.605	1.200	1.200	0.840
1/2 x 3/8 x 1/2"	1.120	1.030	1.120	0.430	0.360	0.430	0.620	0.655	0.620	1.200	1.010	1.197
1/2 x 3/8 x 3/8"	1.040	0.950	1.030	0.430	0.360	0.360	0.540	0.575	0.655	1.200	1.010	1.010
3/4 x 3/4 x 1"	1.450	1.450	1.370	0.500	0.500	0.580	0.888	0.888	0.808	1.460	1.460	1.770
3/4 x 3/4 x 1/2"	1.200	1.200	1.220	0.500	0.500	0.430	0.638	0.638	0.720	1.460	1.460	1.200
3/4 X 3/4 X 3/8"	1.120	1.120	1.130	0.500	0.500	0.360	0.558	0.558	0.755	1.460	1.460	1.010
3/4 X 3/4 X 1/4"	1.050	1.050	1.080	0.540	0.540	0.360	0.510	0.510	0.720	1.460	1.460	0.840
3/4 X 1/2 X 3/4"	1.310	1.220	1.310	0.500	0.430	0.500	0.748	0.720	0.748	1.460	1.200	1.460
3/4 X 1/2 X 1/2"	1.200	1.120	1.220	0.500	0.430	0.430	0.638	0.620	0.720	1.460	1.200	1.200
3/4 X 3/8 X 3/4"	1.310	1.130	1.130	0.500	0.360	0.500	0.935	0.755	0.568	1.460	1.010	1.460
1 X 1 X 1 1/4"	1.670	1.670	1.580	0.580	0.580	0.670	0.983	0.983	0.893	1.770	1.770	2.150
1 X 1 X 3/4"	1.370	1.370	1.450	0.580	0.580	0.500	0.683	0.683	0.888	1.770	1.770	1.460
1 X 1 X 1/2"	1.260	1.260	1.360	0.580	0.580	0.430	0.573	0.573	0.860	1.770	1.770	1.200
1 X 1 X 3/8"	1.180	1.180	1.270	0.580	0.580	0.360	0.493	0.493	0.895	1.770	1.770	1.010
1 X 3/4 X 1"	1.500	1.450	1.500	0.580	0.500	0.580	0.813	0.888	0.813	1.770	1.460	1.770
1 X 3/4 X 3/4"	1.370	1.310	1.450	0.580	0.500	0.500	0.683	0.748	0.888	1.770	1.460	1.460
1 X 3/4 X 1/2"	1.260	1.200	1.360	0.580	0.500	0.430	0.573	0.638	0.860	1.770	1.460	1.200
1 X 1/2 X 1"	1.500	1.360	1.500	0.580	0.430	0.580	0.813	0.860	0.813	1.770	1.200	1.770
1 X 1/2 X 3/4"	1.370	1.220	1.450	0.580	0.430	0.500	0.683	0.720	0.888	1.770	1.200	1.460
1 X 1/2 X 1/2"	1.260	1.120	1.360	0.580	0.430	0.430	0.573	0.620	0.860	1.770	1.200	1.200
1 X 1/4 X 1"	1.500	1.200	1.500	0.580	0.320	0.580	0.813	0.825	0.813	1.770	0.840	1.770
1 X 1/8 X 1"	1.500	1.100	1.500	0.580	0.250	0.580	0.813	0.850	0.813	1.770	0.690	1.770
1 1/4 X 1 1/4 X 1"	1.580	1.580	1.670	0.670	0.670	0.580	0.893	0.893	0.983	2.150	2.150	1.770
1 1/4 X 1 1/4 X 3/4"	1.450	1.450	1.620	0.670	0.670	0.500	0.763	0.763	1.058	2.150	2.150	1.460
1 1/4 X 1 1/4 X 1/2"	1.340	1.340	1.530	0.670	0.670	0.430	0.653	0.653	1.030	2.150	2.150	1.200
1 1/4 X 1 X 1 1/4"	1.750	1.670	1.750	0.670	0.580	0.670	1.063	0.983	1.063	2.150	1.770	2.150
1 1/4 X 1 X 1"	1.580	1.500	1.670	0.670	0.580	0.580	0.893	0.813	0.983	2.150	1.770	1.770
1 1/4 X 1 X 3/4"	1.450	1.370	1.620	0.670	0.580	0.500	0.763	0.683	1.058	2.150	1.770	1.460
1 1/4 x 3/4 x 1 1/4"	1.750	1.620	1.750	0.670	0.500	0.670	1.063	1.058	1.063	2.150	1.460	2.150

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MALLEABLE IRON REDUCING TEES

CLASS 150/CONT.

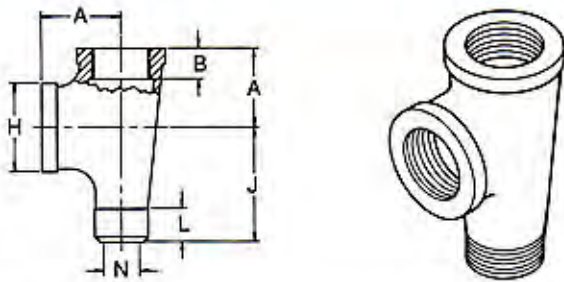
FIGURE 52



NPS H denotes Heel Ell	Center to End X	Center to End Y	Center to End Z	Length of Thread B	Length of Thread B2	Length of Thread B3	Take Out	Take Out	Take Out	Outside Dia. of Band H (min)	Outside Dia. of Band H2 (min)	Outside Dia. of Band H3 (min)
1 1/4 x 3/4 x 1"	1.580	1.450	1.670	0.670	0.500	0.580	0.893	0.888	0.983	2.150	1.460	1.770
1 1/4 x 3/4 x 3/4"	1.450	1.310	1.620	0.670	0.500	0.500	0.763	0.748	1.058	2.150	1.460	1.460
1 1/4 x 1/2 x 1 1/4"	H	1.750	1.530	1.750	0.670	0.430	1.063	1.030	1.063	2.150	1.200	2.150
1 1/2 x 1 1/2 x 1 1/4"	1.820	1.820	1.880	0.700	0.700	0.670	1.133	1.133	1.193	2.430	2.430	2.150
1 1/2 x 1 1/2 x 1"	1.650	1.650	1.800	0.700	0.700	0.580	0.963	0.963	1.113	2.430	2.430	1.770
1 1/2 x 1 1/2 x 3/4"	1.520	1.520	1.750	0.700	0.700	0.500	0.833	0.833	1.188	2.430	2.430	1.460
1 1/2 x 1 1/2 x 1/2"	1.410	1.410	1.660	0.700	0.700	0.430	0.723	0.723	1.160	2.430	2.430	1.200
1 1/2 x 1 1/4 x 1 1/2"	1.940	1.880	1.940	0.700	0.670	0.700	1.253	1.193	1.253	2.430	2.150	2.430
1 1/2 x 1 1/4 x 1 1/4"	1.820	1.750	1.880	0.700	0.670	0.670	1.133	1.063	1.193	2.430	2.150	2.150
1 1/2 x 1 1/4 x 1"	1.650	1.580	1.800	0.700	0.670	0.580	0.963	0.893	1.113	2.430	2.150	1.770
1 1/2 x 1 1/4 x 3/4"	1.520	1.450	1.750	0.700	0.670	0.500	0.833	0.763	1.188	2.430	2.150	1.460
1 1/2 x 1 x 1 1/2"	1.940	1.800	1.940	0.700	0.580	0.700	1.253	1.113	1.253	2.430	1.770	2.430
1 1/2 x 1 x 1"	1.650	1.500	1.800	0.700	0.580	0.580	0.963	0.813	1.113	2.430	1.770	2.430
1 1/2 x 3/4 x 1 1/2"	H	1.940	1.750	1.940	0.700	0.500	1.253	1.188	1.253	2.430	1.460	2.430
1 1/2 x 3/4 x 3/4"	1.550	1.350	1.770	0.700	0.500	0.500	0.863	0.788	1.208	2.430	1.460	1.460
1 1/2 x 1/2 x 1 1/2"	H	1.940	1.660	1.940	0.700	0.430	1.253	1.160	1.253	2.430	1.200	2.430
2 x 2 x 1 1/2"	2.020	2.020	2.160	0.750	0.750	0.700	1.270	1.270	1.473	2.960	2.960	2.430
2 x 2 x 1 1/4"	1.900	1.900	2.100	0.750	0.750	0.670	1.150	1.150	1.413	2.960	2.960	2.150
2 x 2 x 1"	1.730	1.730	2.020	0.750	0.750	0.580	0.980	0.980	1.333	2.960	2.960	1.770
2 x 2 x 3/4"	1.600	1.600	1.970	0.750	0.750	0.500	0.850	0.850	1.408	2.960	2.960	1.460
2 x 2 x 1/2"	1.490	1.490	1.880	0.750	0.750	0.430	0.740	0.740	1.380	2.960	2.960	1.200
2 x 1 1/2 x 2"	2.250	2.160	2.250	0.750	0.700	0.750	1.500	1.473	1.500	2.960	2.430	2.960
2 x 1 1/2 x 1 1/2"	2.020	1.940	2.160	0.750	0.700	0.700	1.270	1.253	1.473	2.960	2.430	2.430
2 x 1 1/2 x 1 1/4"	1.900	1.820	2.100	0.750	0.700	0.670	1.150	1.133	1.413	2.960	2.430	2.150
2 x 1 1/2 x 1"	1.730	1.650	2.020	0.750	0.700	0.580	0.980	0.963	1.333	2.960	2.430	1.770
2 x 1 1/4 x 2"	2.250	2.100	2.250	0.750	0.670	0.750	1.500	1.413	1.500	2.960	2.150	2.960
2 x 1 1/4 x 1 1/4"	1.900	1.750	2.100	0.750	0.670	0.670	1.150	1.063	1.413	2.960	2.150	2.150
2 x 1 x 2"	H	2.250	2.020	2.250	0.750	0.580	1.500	1.333	1.500	2.960	1.770	2.960
2 x 1 x 1"	1.780	1.680	2.080	0.750	0.580	0.580	1.030	0.993	1.393	2.960	1.770	1.770
2 x 3/4 x 2"	2.250	1.970	2.250	0.750	0.500	0.750	1.500	1.408	1.500	2.960	1.460	2.960
2 x 1/2 x 2"	2.250	1.880	2.250	0.750	0.430	0.750	1.500	1.380	1.500	2.960	1.200	2.960
2 1/2 x 2 1/2 x 2"	2.390	2.390	2.600	0.920	0.920	0.750	1.453	1.453	1.850	3.590	3.590	2.960
3 x 3 x 2 1/2"	2.830	2.830	2.990	0.980	0.980	0.920	1.830	1.830	2.053	4.280	4.280	3.590
3 x 3 x 2"	2.520	2.520	2.890	0.980	0.980	0.750	1.520	1.520	2.140	4.280	4.280	2.960
3 x 3 x 1 1/2"	2.290	2.290	2.800	0.980	0.980	0.700	1.290	1.290	2.113	4.280	4.280	2.430
3 x 3 x 1 1/4"	2.170	2.170	2.740	0.980	0.980	0.670	1.170	1.170	2.053	4.280	4.280	2.150
3 x 3 x 1"	2.000	2.000	2.660	0.980	0.980	0.580	1.000	1.000	1.973	4.280	4.280	1.770
3 x 3 x 3/4"	1.870	1.870	2.610	1.020	1.020	0.540	0.850	0.850	2.070	4.280	4.280	1.460
3 x 2 x 2"	2.520	2.250	2.890	0.980	0.750	0.750	1.520	1.500	2.140	4.280	2.960	2.960

MALLEABLE IRON STREET TEE CLASS 150

FIGURE 64

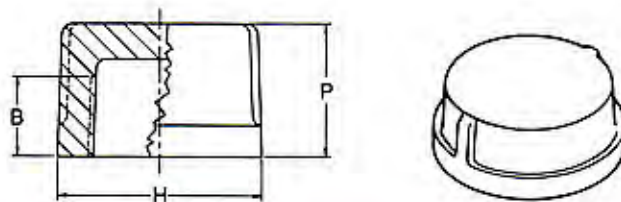


NPS	Center To End A	Center to Male End J	Take Out Female End	Take Out Male End	Outside Band Dia. (min) H	Length of Thread (min) B	Length of External Thrd (min) L	Maximum Port Dia. Male End N
3/4"	1.310	1.890	0.748	1.328	1.460	0.500	0.550	0.690
1"	1.500	2.140	0.813	1.453	1.770	0.580	0.680	0.910
1 1/4"	1.750	2.450	1.063	1.763	2.150	0.670	0.710	1.190

MALLEABLE IRON PIPE CAPS CLASS 150

FIGURE 49

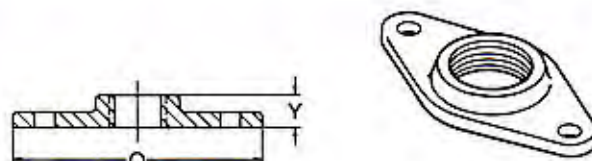
NPS	Outside Diameter H (min)	Overall Height P (min)	Length of Threads B (min)
1/4"	0.840	0.630	0.320
3/8"	1.010	0.740	0.360
1/2"	1.200	0.870	0.430
3/4"	1.460	0.970	0.500
1"	1.770	1.160	0.580
1 1/4"	2.150	1.280	0.670
1 1/2"	2.430	1.330	0.700
2"	2.460	1.450	0.750
2 1/2"	3.590	1.700	0.920
3"	4.280	1.800	0.980
4"	5.400	2.080	1.080
STEEL			
1/8"	0.560	0.530	0.250
1/4"	0.690	0.630	0.320
3/8"	0.840	0.740	0.360



MALLEABLE IRON WASTE NUTS CLASS 150 *

FIGURE 62

PIPE SIZE	End to End O	Height Y
1/2"	2.420	.340
3/4"	2.650	.320
1"	2.990	.370



* Manufactured to WARD Specifications

MALLEABLE IRON COUPLING CLASS 150

STRAIGHT COUPLING

NPS	Length of Coupling W	Outside Dia. of Band H (min)	Length of Threads B (min)
1/8"	0.960	0.690	0.250
1/4"	1.060	0.840	0.320
3/8"	1.160	1.010	0.360
1/2"	1.340	1.200	0.430
3/4"	1.520	1.460	0.500
1"	1.670	1.770	0.580
1 1/4"	1.930	2.150	0.670
1 1/2"	2.150	2.430	0.700
2"	2.530	2.960	0.750
2 1/2"	2.880	3.590	0.920
3"	3.180	4.280	0.980
4"	3.690	5.400	1.080

*STEEL

RIGHT AND LEFT HAND THREAD COUPLING

NPS	Length of Coupling A	Outside Dia. of Band H (min)	Length of Threads B (min)
1/2"	1.340	1.200	0.430
3/4"	1.520	1.460	0.500
1"	1.670	1.770	0.580
1 1/4"	1.930	2.150	0.670
1 1/2"	2.150	2.430	0.700
2"	2.530	2.960	0.750

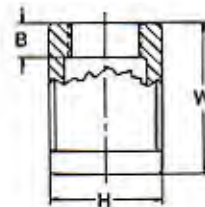


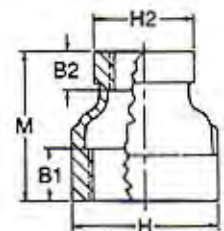
FIGURE 53



MALLEABLE IRON REDUCING COUPLING CLASS 150

FIGURE 53

NPS	Overall Length M	Outside Diameter Large End H2 (min)	Outside Diameter Small End H (min)	Take Out	Take Out	Length of Threads Large B1 (min)	Length of Threads Small B2 (min)
1/4 x 1/8"	1.000	0.840	0.690	0.161	0.230	0.320	0.250
3/8 x 1/4"	1.130	1.010	0.840	0.155	0.175	0.360	0.320
1/2 x 3/8"	1.250	1.200	1.010	0.095	0.215	0.430	0.360
1/2 x 1/4"	1.250	1.200	0.840	0.095	0.235	0.430	0.320
1/2 X 1/8"	1.250	1.237	0.733	0.125	0.375	0.470	0.290
3/4 x 1/2"	1.440	1.460	1.200	0.120	0.190	0.500	0.430
3/4 x 3/8"	1.440	1.460	1.010	0.120	0.310	0.500	0.360
3/4 x 1/4"	1.440	1.460	0.840	0.120	0.330	0.500	0.320
3/4 X 1/8"	1.440	1.344	0.733	0.138	0.325	0.540	0.290
1 x 3/4"	1.690	1.770	1.460	0.185	0.245	0.580	0.500
1 x 1/2"	1.690	1.770	1.200	0.185	0.315	0.580	0.430
1 x 3/8"	1.690	1.770	1.010	0.185	0.435	0.580	0.360
1 1/4 x 1"	2.060	2.150	1.770	0.342	0.370	0.670	0.580
1 1/4 x 3/4"	2.060	2.150	1.460	0.350	0.430	0.670	0.500
1 1/4 x 1/2"	2.060	2.150	1.200	0.350	0.500	0.670	0.430
1 1/2 x 1 1/4"	2.310	2.430	2.150	0.475	0.475	0.700	0.670
1 1/2 x 1"	2.310	2.430	1.770	0.475	0.495	0.700	0.580
1 1/2 x 3/4"	2.310	2.430	1.460	0.475	0.555	0.700	0.500
1 1/2 x 1/2"	2.310	2.430	1.200	0.475	0.625	0.700	0.430
2 x 1 1/2"	2.810	2.960	2.430	0.655	0.725	0.750	0.700
2 x 1 1/4"	2.810	2.960	2.150	0.705	0.725	0.750	0.670
2 x 1"	2.810	2.960	1.770	0.705	0.725	0.750	0.580
2 x 3/4"	2.810	2.960	1.460	0.705	0.805	0.750	0.500
2 x 1/2"	2.810	2.960	1.200	0.705	0.875	0.750	0.430
2 1/2 x 2"	3.250	3.590	2.960	0.695	0.925	0.920	0.750
2 1/2 x 1 1/2"	3.250	3.590	2.430	0.695	0.945	0.920	0.700
3 x 2 1/2"	3.690	4.280	3.590	0.825	0.915	0.980	0.920
3 x 2"	3.690	4.280	2.960	0.825	1.145	0.980	0.750
3 x 1 1/2"	3.690	4.280	2.430	0.825	1.165	0.980	0.700
3 x 1 1/4"	3.690	4.280	2.150	0.825	1.165	0.980	0.670
3 x 1"	3.690	4.280	1.770	0.825	1.185	0.980	0.580
4 x 3"	4.380	5.400	4.280	1.065	1.170	1.080	0.980
4 x 2"	4.380	5.400	2.960	1.065	1.490	1.080	0.750



MALLEABLE IRON EXTENSION PIECES CLASS 150 *

	Overall Length	Length of Internal Threads	Length of External Threads
PIPE SIZE	A	B	C
3/8"	1.500	.400	.408
1/2"	1.950	.480	.534
3/4"	2.060	.550	.546
1"	2.230	.640	.683
1 1/4"	2.562	.710	.637

* Manufactured to WARD Specifications

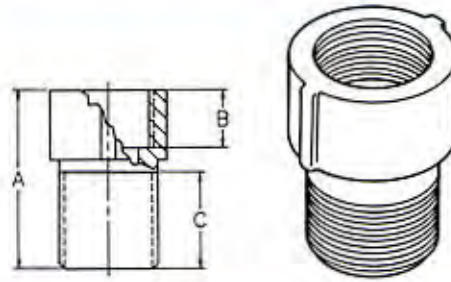
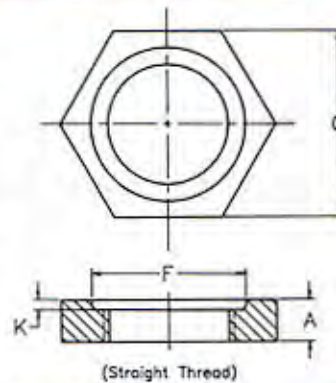


FIGURE 54

MALLEABLE IRON LOCKNUTS CLASS 150

	Overall Height	Packing Groove Width	Length Across Flat	Packing Groove Depth
Pipe Size	A(min)	F	C (min)	K
1/8"	0.190	0.500	0.690	0.040
1/4"	0.250	0.660	0.840	0.060
3/8"	.280	.770	1.000	.060
1/2"	.310	.970	1.180	.060
3/4"	.340	1.230	1.430	.060
1"	.380	1.500	1.750	.060
1 1/4"	.420	1.860	2.100	.060
1 1/2"	.470	2.120	2.350	.060
2"	.530	2.630	2.880	.090



*Steel
* Made to ANSI B16.14

FIGURE 55

MALLEABLE IRON RETURN BEND CLASS 150

NPS	Center to Center R	Outside Dia. of Band H (min)	Length of Threads B (min)
1/2"	1.500	1.200	0.430
3/4"	2.000	1.460	0.500
1"	3.500	1.770	0.580

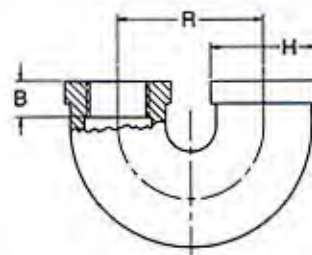


FIGURE 60

MALLEABLE IRON CROSS CLASS 150

NPS	Center to End A	Outside Dia. Band H (min)	Length of Thread B (min)	Take Out Dimension
1/2"	1.120	1.200	0.430	0.620
3/4"	1.310	1.460	0.500	0.748
1"	1.500	1.770	0.580	0.813
1 1/4"	1.750	2.150	0.670	1.063
1 1/2"	1.940	2.430	0.700	1.253
2"	2.250	2.960	0.750	1.500

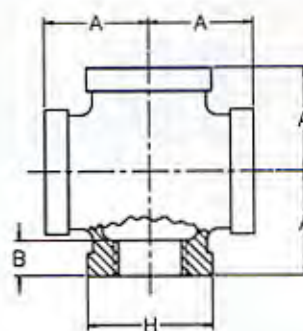


FIGURE 61

EXTRA HEAVY MALLEABLE PIPE FITTINGS CLASS 300 - (A.A.R.)

GENERAL DIMENSIONS / IN INCHES THESE DIMENSIONS APPLY TO BOTH STRAIGHT AND REDUCING FITTINGS

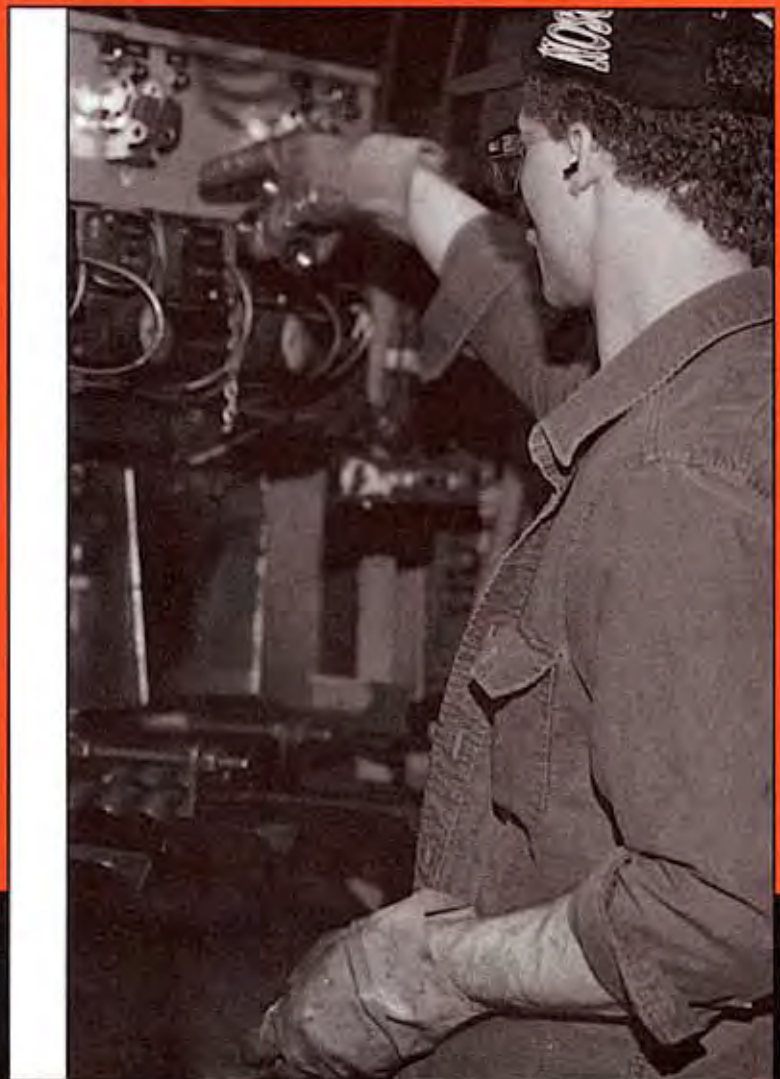
Pipe Size	O.D. of Band	Thread Length (min)
.25"	.938"	.438"
.375"	1.125"	.484"
.5"	1.344"	.563"
.75"	1.625"	.625"
1"	1.938"	.750"
1.25"	2.375"	.844"
1.5"	2.688"	.875"
2"	3.281"	1.000"
3"	4.625"	1.938"

TABLE A
PRESSURE - TEMPERATURE RATINGS

Temperature F	SIZES		
	1/4" - 1"	1 1/4" - 2"	2 1/2" - 3"
-20 to 150	2000	1500	1000
200	1785	1350	910
250	1575	1200	825
300	1360	1050	735
350	1150	900	650
400	935	750	560
450	725	600	475
500	510	450	385
550	300	300	300

Ward Class 300 Malleable Iron fittings are designed to handle higher pressures and more rugged service than our Class 150 fittings. Like all of Ward's fittings, Class 300 fittings are made with the most sophisticated metallurgical and processing controls available. Ward's quality assurance program ensures that the iron is made with high quality raw materials and processed according to rigorous standards. Iron samples are continuously analyzed to ensure that a closegrained, high strength, non-porous iron is produced.

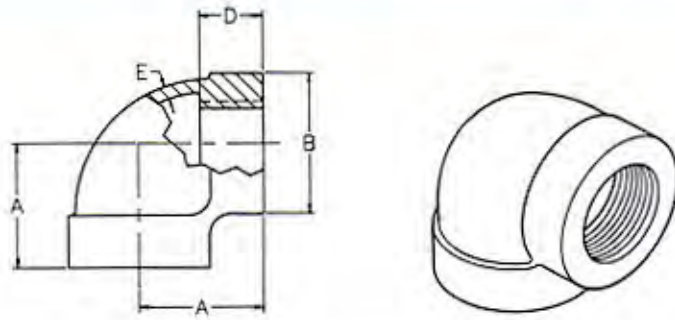
Ward starts with high quality iron then accurately machines threads that comply with the precise standards developed by the American National Standards Institute (ANSI). The threads have an accurate form, thread length and straightness to allow them to easily engage threaded pipe. In addition, Ward fittings have a chamfered opening to allow faster and easier pipe engagement. This feature also protects the fitting threads from damage during handling.



Material: ASTM A197
Dimensions: ANSI/ASME B 16.3
 ANSI/ASME B 1.20.1
Pressure Ratings: ANSI/ASME B 16.3
Coatings: ANSI/ASME B 16.3
 ASTM A 153
Additional Specifications: Federal Spec. WWP 521
 UL, ULC AND FM, as applicable.

MALLEABLE IRON 90° ELLS CLASS 300

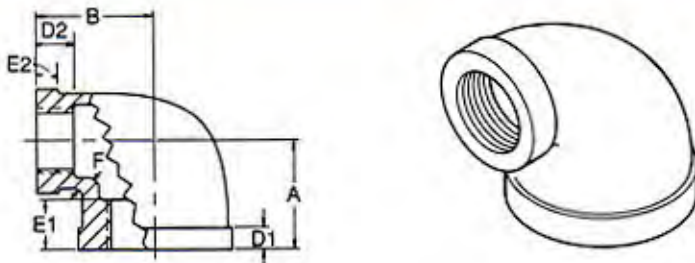
FIGURE 65



NPS	Center to End A	Outside Dia of Band B (min)	Length of Threads D (min)	Metal Thickness E	Take Out
1/4"	0.940	0.930	0.430	0.140	0.565
3/8"	1.060	1.120	0.470	0.150	0.685
1/2"	1.250	1.340	0.570	0.160	0.750
3/4"	1.440	1.630	0.640	0.180	0.878
1"	1.630	1.950	0.750	0.200	0.943
1 1/4"	1.940	2.390	0.840	0.220	1.703
1 1/2"	2.130	2.680	0.870	0.240	1.443
2"	2.500	3.280	1.000	0.260	1.750
3"	3.380	4.620	1.230	0.350	2.380

MALLEABLE IRON REDUCING 90° ELLS CLASS 300

FIGURE 65

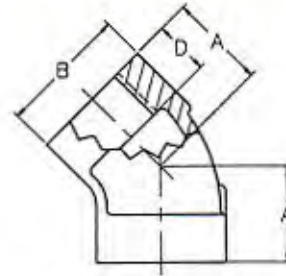


NPS	Center to End A	Center to End B	Length of Thread E1 (min)	Length of Thread E2 (min)	Take Out	Take Out	Metal Thickness F
3/8 X 1/4"	1.030	1.040	0.470	0.430	0.655	0.665	0.150
1/2 X 3/8"	1.190	1.190	0.570	0.470	0.690	0.815	0.160
3/4 X 1/2"	1.310	1.380	0.640	0.570	0.748	0.880	0.180
1 X 3/4"	1.500	1.560	0.750	0.640	0.813	0.998	0.200

MALLEABLE IRON 45° ELLS CLASS 300

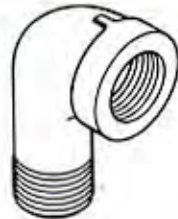
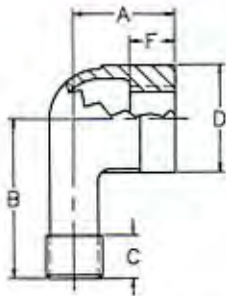
FIGURE 65A

NPS	Center to End A	Outside Dia. of Band B (min)	Take Out	Length of Thread D (min)
1/4"	0.810	0.930	0.435	0.430
3/8"	0.880	1.120	0.505	0.470
1/2"	1.000	1.340	0.500	0.570
3/4"	1.130	1.630	0.568	0.640
1"	1.310	1.950	0.623	0.750
1 1/4"	1.500	2.390	0.813	0.840
1 1/2"	1.690	2.680	1.003	0.870
2"	2.000	3.280	1.250	1.000



MALLEABLE IRON STREET 90° ELLS CLASS 300

FIGURE 65B

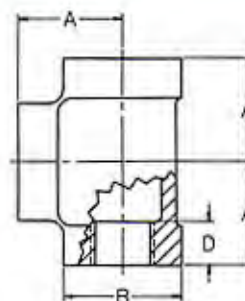


NPS	Center to End A	Center to End (male) B	Length of Ext Thd C (min)	Outside Dia. of Band D (min)	Take Out	Length of Thread F (min)
1/4"	0.940	1.440	0.400	0.930	0.565	0.430
3/8"	1.060	1.630	0.410	1.120	0.685	0.470
1/2"	1.250	2.000	0.530	1.340	0.750	0.570
3/4"	1.440	2.190	0.550	1.630	0.878	0.640
1"	1.630	2.560	0.680	1.950	0.943	0.750
1 1/4"	1.940	2.880	0.710	2.390	1.253	0.840
1 1/2"	2.130	3.130	0.720	2.680	1.443	0.870
2"	2.500	3.690	0.760	3.280	1.750	1.000

MALLEABLE IRON TEES STRAIGHT CLASS 300

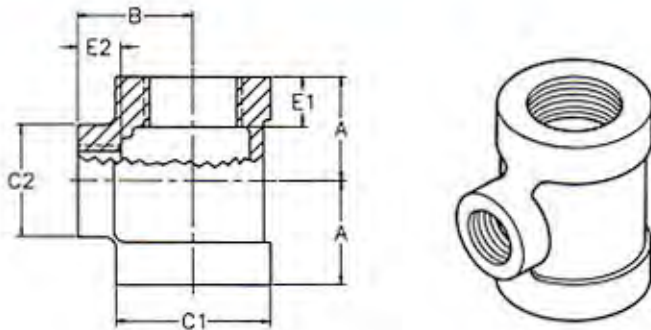
FIGURE 66

NPS	Center to End A	Outside Dia. of Band B (min)	Length of Threads D (min)	Take Out
1/4"	0.940	0.930	0.430	0.565
3/8"	1.060	1.120	0.470	0.685
1/2"	1.250	1.340	0.570	0.750
3/4"	1.440	1.630	0.640	0.878
1"	1.630	1.950	0.750	0.943
1 1/4"	1.940	2.390	0.840	1.253
1 1/2"	2.130	2.680	0.870	1.443
2"	2.500	3.280	1.000	1.750
3"	3.380	4.620	1.230	2.380



MALLEABLE IRON REDUCING TEES CLASS 300

FIGURE 66

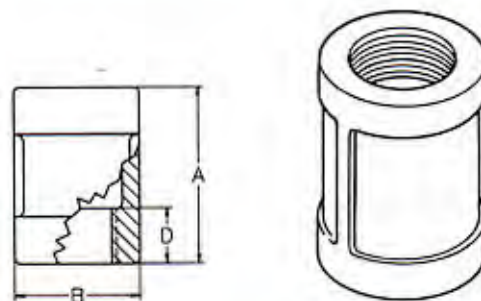


NPS	Center to End A	Center to End B	Outside Dia. of Band C1 (min)	Outside Dia. of Band C2 (min)	Length of Thread (run) E1 (min)	Length of Thread (outlet) E2 (min)	Take Out	Take Out
3/8 x 1/4"	1.020	1.020	1.120	0.930	0.470	0.430	0.645	0.645
1/2 x 3/8"	1.190	1.190	1.340	1.120	0.570	0.470	0.690	0.815
1/2 x 1/4"	1.130	1.120	1.340	0.930	0.570	0.430	0.630	0.745
3/4 x 1/2"	1.310	1.380	1.630	1.340	0.640	0.570	0.748	0.880
1 x 3/4"	1.500	1.560	1.950	1.630	0.750	0.640	0.813	0.998
1 x 1/2"	1.440	1.500	1.950	1.340	0.750	0.570	0.753	1.000
1 1/4 x 1"	1.750	1.810	2.390	1.950	0.840	0.750	1.063	1.123
1 1/4 x 3/4"	1.630	1.750	2.390	1.630	0.840	0.640	0.943	1.188
1 1/2 x 1"	1.810	2.000	2.680	1.950	0.870	0.750	1.123	1.313
1 1/2 x 3/4"	1.690	1.880	2.680	1.630	0.870	0.640	1.003	1.318
2 x 1 1/2"	2.250	2.380	3.280	2.680	1.000	0.870	1.500	1.693

MALLEABLE IRON STRAIGHT COUPLING CLASS 300

FIGURE 67

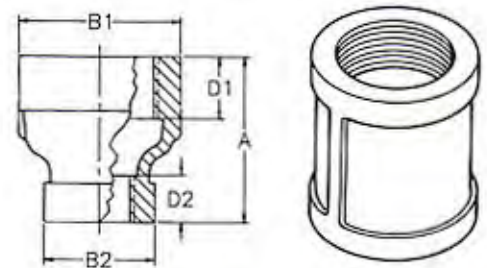
NPS	Overall Length A	Outside Dia. of Band B (min)	Length of Thread D (min)
1/4"	1.370	0.930	0.430
3/8"	1.620	1.120	0.470
1/2"	1.870	1.340	0.570
3/4"	2.120	1.630	0.640
1"	2.370	1.950	0.750
1 1/4"	2.870	2.390	0.840
1 1/2"	2.870	2.680	0.870
2"	3.620	3.280	1.000



MALLEABLE IRON REDUCING COUPLING CLASS 300

FIGURE 67

NPS	Length of Fitting A	Outside Dia. of Large End B1 (min)	Outside Dia. of Small End B2 (min)	Length of Thread Large End D1	Length of Thread Small End D2
3/8 x 1/4"	1.440	1.120	0.930	0.470	0.430
1/2 x 3/8"	1.690	1.340	1.120	0.570	0.470
1/2 x 1/4"	1.690	1.340	0.930	0.570	0.430
3/4 x 1/2"	1.750	1.630	1.340	0.640	0.570
1 x 3/4"	2.000	1.950	1.630	0.750	0.640
1 x 1/2"	2.000	1.950	1.340	0.750	0.570
1 1/4 x 1"	2.380	2.390	1.950	0.840	0.750
1 1/4 x 3/4"	2.380	2.390	1.630	0.840	0.640
1 1/2 x 1 1/4"	2.690	2.680	2.390	0.870	0.840
1 1/2 x 1"	2.690	2.680	1.950	0.870	0.750
1 1/2 x 3/4"	2.690	2.680	1.630	0.870	0.640
2 X 1 1/2"	3.190	3.280	2.680	1.000	0.870
2 X 1"	3.190	3.280	1.950	1.000	0.750



MALLEABLE IRON PIPE CAPS CLASS 300

FIGURE 69

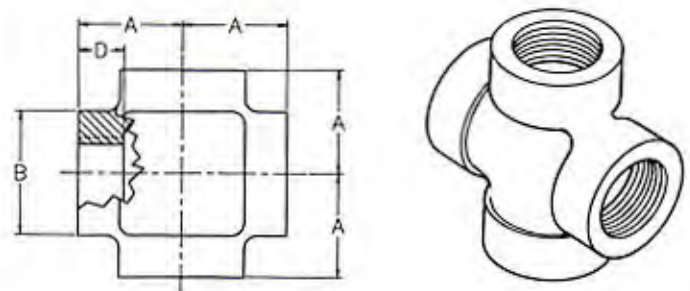
NPS	Overall Height A	Outside Dia. of Band B	Length of Thread D
1/4"	0.780	0.930	0.430
3/8"	0.830	1.120	0.470
1/2"	0.980	1.340	0.570
3/4"	1.080	1.630	0.640
1"	1.260	1.950	0.750
1 1/4"	1.380	2.390	0.840
1 1/2"	1.430	2.680	0.870
2"	1.680	3.280	1.000



MALLEABLE IRON CROSS CLASS 300

FIGURE 68

NPS	Center to End A	Outside Dia. of Band B (min)	Length of Thread D (min)	Take Out
1/2"	1.250	1.340	0.570	0.750
3/4"	1.440	1.630	0.640	0.878
1"	1.630	1.950	0.750	0.943
1 1/4"	1.940	2.390	0.840	1.253
1 1/2"	2.130	2.680	0.870	1.443
2"	2.500	3.280	1.000	1.750



WARD UNIONS

RUGGED-STRONG Made of Best Quality Malleable Iron

Extra heavy brass seat ring accurately machined to insure perfect seating under difficult conditions.

- SUITABLY CHAMFERED
- RUST PROOF TREATED
- PROPERLY THREADED

Continuous, careful inspection during each manufacturing operation.



TYPES AVAILABLE

Class 150 Brass-to-Iron
Class 250 Brass-to-Iron
Class 300 Brass-to-Iron
Class 150 All Iron Seat
Class 300 All Iron Seat
Class 150 Gasket Unions
Class 300 Brass-to-Brass
Class 150 Di-electric Unions
(Female iron pipe to Sweat Copper)

QUALITY PIPE UNIONS

Pipe Size	Overall Length (min)
1/4"	1.563"
3/8"	1.625"
1/2"	1.750"
3/4"	2.000"
1"	2.125"
1 1/4"	2.375"
1 1/2"	2.750"
2"	3.000"
2 1/2"	3.625"
3"	4.000"

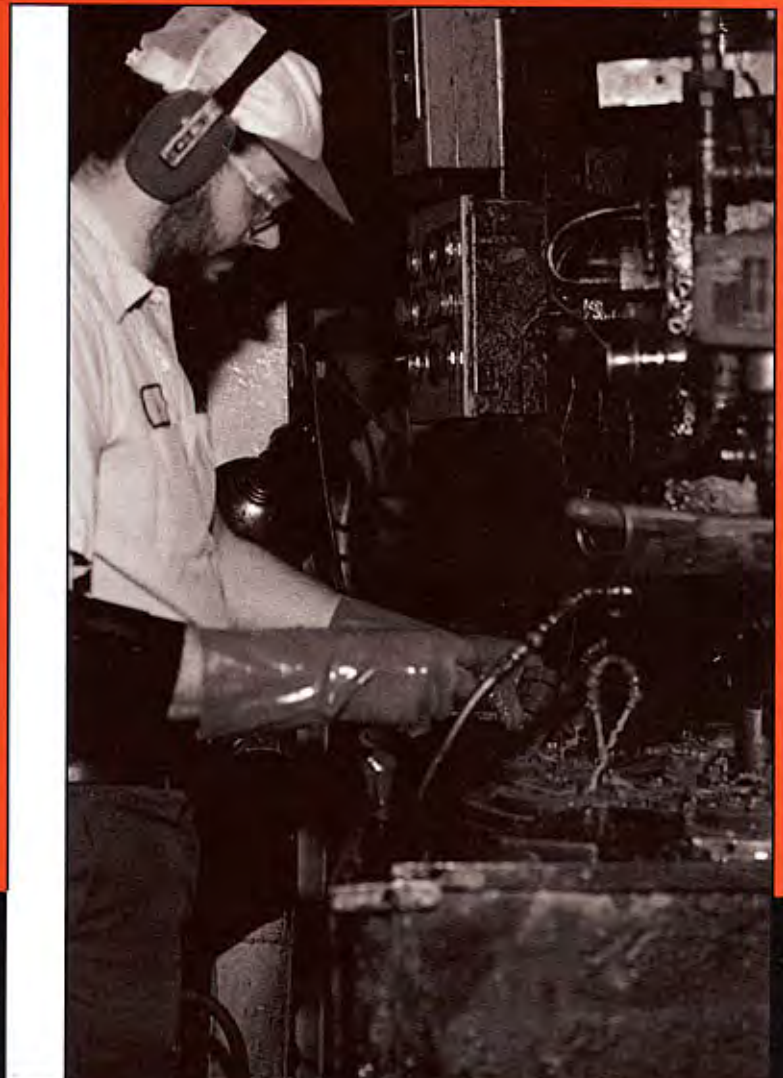
Temp F	Class 150	Class 250	Class 300
-20 to 150	300	500	600
200	265	455	550
250	225	405	505
300	185	460	460
350	150	315	415
400	110	270	370
450	75	225	325
500	---	180	280
550	---	130	230

Throughout the entire process of the manufacture of WARD Unions, special emphasis is placed upon the control and accuracy of each operation.

WARD unions are made from closely grained, high tensile iron; produced under expert laboratory supervision. Modern methods of foundry practice and carefully supervised molding, produce castings that are smooth and clean in every respect and free from imperfection.

WARD unions are made strictly to specification as published by the American National Standards Institute for threaded pipe unions. They also conform to United States Federal Specifications. Each opening is chamfered permitting easy assembly. WARD unions make up easily and pull tight for a sealed assembly.

Continuous and careful inspection by trained employees during and after each operation produce quality products which will give satisfaction to the user.

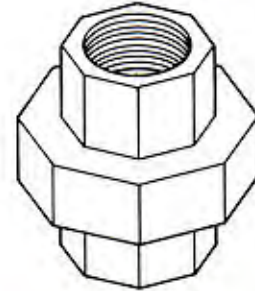
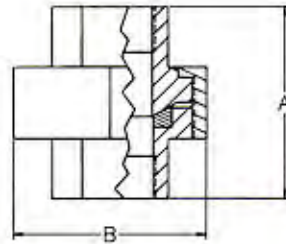


Material: ASTM A197
 Dimensions: ANSI B 16.39
 ANSI B 1.20.1
 Coatings: ASTM A 153, A 165
 Pressure Ratings: ANSI B 16.39
 Additional Specifications: Federal Spec. WWP 531
 (CLASS 250), UL as applicable

WARD UNION BRASS TO IRON SEAT CLASS 150

FIGURE 91

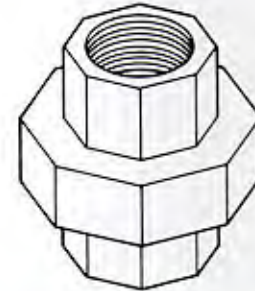
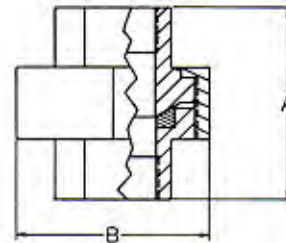
NPS	Overall Length	Width of Nut
	A	B
1/8"	1.375	1.000
1/4"	1.562	1.250
3/8"	1.625	1.500
1/2"	1.750	1.687
3/4"	2.000	2.000
3/4 X 1/2"	1.687	1.625
1"	2.125	2.250
1 1/4"	2.375	2.812
1 1/2"	2.750	3.062
2"	3.000	3.687
2 1/2"	3.625	4.687
3"	4.000	5.187
4"	4.750	6.850



WARD UNION BRASS TO IRON SEAT CLASS 250

FIGURE 92

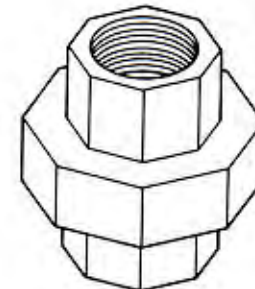
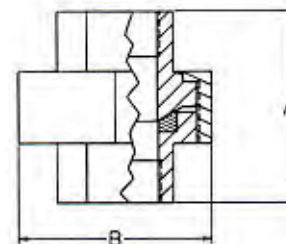
NPS	Overall Length	Width of Nut
	A	B
1/8"	1.375	1.062
1/4"	1.625	1.312
3/8"	1.656	1.312
1/2"	2.125	1.687
3/4"	2.250	2.250
1"	2.625	2.500
1 1/4"	2.812	3.000
1 1/2"	3.000	3.281
2"	3.562	3.937
2 1/2"	3.687	4.531
3"	4.125	5.312
4"	4.750	6.850



WARD UNION BRASS TO IRON SEAT CLASS 300

FIGURE 93

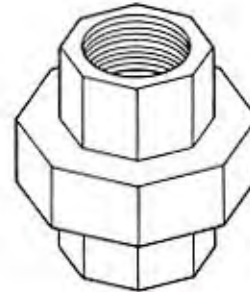
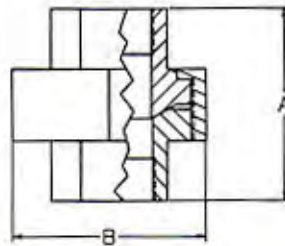
NPS	Overall Length	Width of Nut
	A	B
1/8"	1.375	1.062
1/4"	1.625	1.312
3/8"	1.656	1.312
1/2"	2.125	1.687
3/4"	2.250	2.250
1"	2.625	2.500
1 1/4"	2.812	2.968
1 1/2"	3.000	3.281
2"	3.562	3.937
2 1/2"	3.687	4.531
3"	4.125	5.312



WARD UNION IRON TO IRON SEAT CLASS 150

FIGURE 94

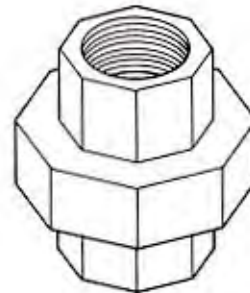
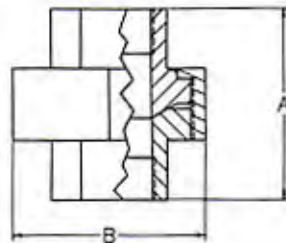
NPS	Overall Length	Width of Nut
	A	B
1/8"	1.375	1.000
1/4"	1.562	1.250
3/8"	1.625	1.500
1/2"	1.750	1.687
3/4"	2.000	2.000
1"	2.125	2.250
1 1/4"	2.375	2.812
1 1/2"	2.750	3.062
2"	3.000	3.687
2 1/2"	3.625	4.687
3"	4.000	5.187



WARD UNION IRON TO IRON SEAT CLASS 300

FIGURE 99

NPS	Overall Length	Width of Nut
	A	B
1/8"	1.375	1.062
1/4"	1.625	1.312
3/8"	1.656	1.312
1/2"	2.125	1.687
3/4"	2.250	2.250
1"	2.625	2.500
1 1/4"	2.812	2.968
1 1/2"	3.000	3.281
2"	3.562	3.937
2 1/2"	3.687	4.531
3"	4.125	5.312

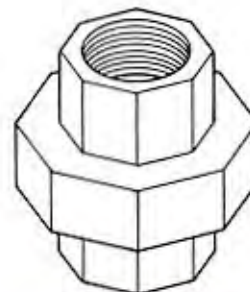
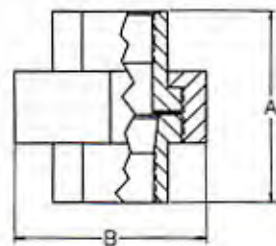


WARD GASKET TYPE UNION MALLEABLE IRON

CLASS 150

FIGURE 95

NPS	Overall Length	Width of Nut
	A	B
3/8"	1.625	1.312
1/2"	1.750	1.687
3/4"	2.000	2.000
1"	2.125	2.250
1 1/4"	2.375	2.812
1 1/2"	2.750	3.062
2"	3.000	3.687

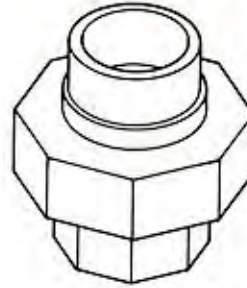
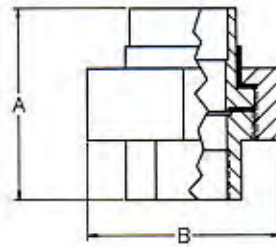


WARD DI-ELECTRIC UNIONS IRON TO BRASS *

CLASS 150

FIGURE 96

NPS	Overall Length	Width of Nut
	A	B
3/4 X 3/4" W	1.312	1.687
3/4 X 1/2" W	1.875	1.687
1/2 X 1/2" W	1.875	1.687

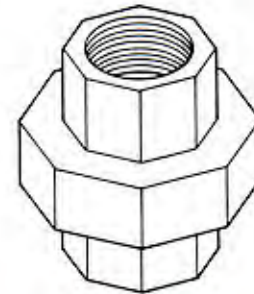
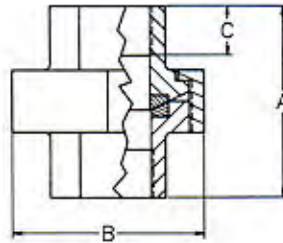


* Manufactured to WARD Specifications

WARD UNION BRASS TO BRASS SEAT CLASS 300

FIGURE 98

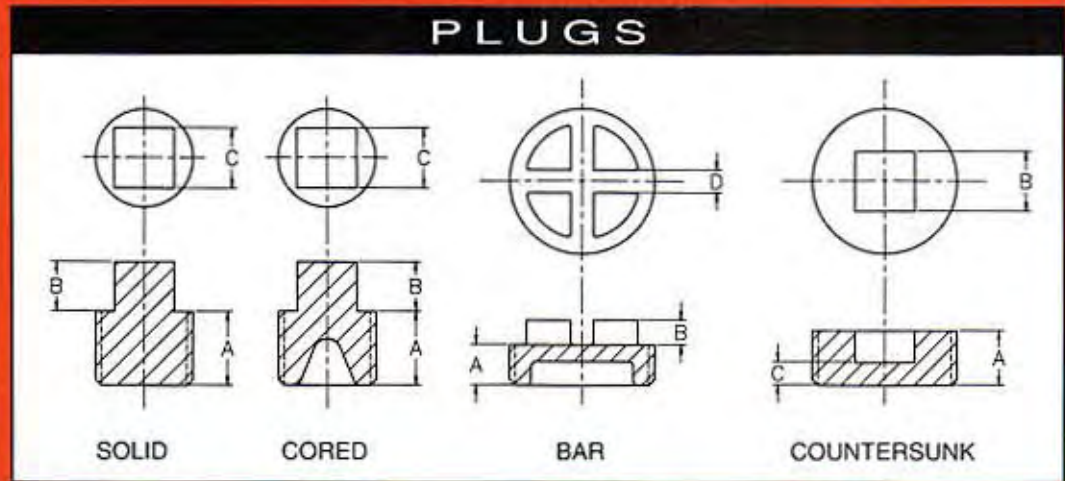
NPS	Overall Length	Width of Nut	Length of Thread
	A	B	C
1/4"	1.625	1.312	.562
3/8"	1.656	1.312	.562
1/2"	2.125	1.687	.812
3/4"	2.250	2.250	.875
1"	2.625	2.500	.937
1 1/4"	2.812	2.968	1.000
1 1/2"	3.000	3.281	1.125
2"	3.562	3.937	1.375
2 1/2"	3.687	4.531	1.375
3"	4.125	5.312	1.500
*4"	4.750	6.850	1.687



*UL Standards not applicable to 4" size unions.

PLUGS AND BUSHINGS

PIPE SIZE	THREAD LENGTH "A"
1/8"	.370
1/4"	.440
3/8"	.480
1/2"	.560
3/4"	.630
1"	.750
1 1/4"	.800
1 1/2"	.830
2"	.880
2 1/2"	1.070
3"	1.130
3 1/2"	1.180
4"	1.220
5"	1.310
6"	1.400
8"	1.570
10"	1.925



WARD Plugs and Bushings are produced in both Malleable Iron and Cast Iron grades. The iron from which they are made is held to strict formula by careful chemical analysis and control.

Tapping is done on the most modern type of threading machines.

Every fitting is hand sorted and inspected to eliminate defective castings.

Ward plugs and bushings comply with the following standards and specifications:

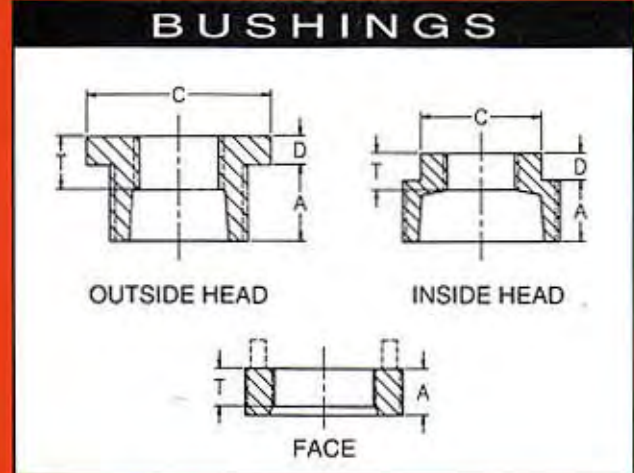
Material: ASTM A197 for malleable iron
ASTM A126 Class A Minimum for cast iron

Dimensions: ANSI B 16.14
ANSI B 1.20.1 for pipe threads

Pressure Ratings: ANSI/ASME B 16.3 for malleable iron
ANSI/ASME B 16.4 for cast iron

Coatings: ASTM (ANSI) A 153 for galvanizing

Additional Specifications: UL, ULC AND FM where applicable.



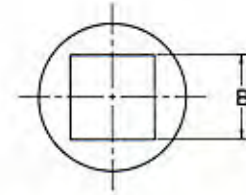
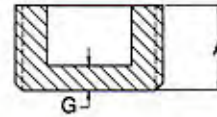
Pipe Size	External Thd Length (minimum) "A"	Internal Thd Length (minimum) "T"
1/4"	.440	.320
3/8"	.480	.360
1/2"	.560	.430
3/4"	.630	.500
1"	.750	.580
1 1/4"	.800	.670
1 1/2"	.830	.700
2"	.880	.750
2 1/2"	1.070	.920
3"	1.130	.980
3 1/2"	1.180	1.030
4"	1.220	1.080
5"	1.310	1.180
6"	1.400	1.280
8"	1.570	---
10"	1.925	---

MALLEABLE IRON COUNTERSUNK PLUGS

FIGURE 05

NPS	Thread Length A (min)	Metal Thickness G	Nominal Size of Square B
*1/4"	0.440	0.090	0.250
*3/8"	0.480	0.130	0.310
1/2"	0.560	0.375	0.160
3/4"	0.630	0.500	0.180
1"	0.750	0.500	0.200

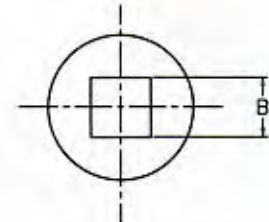
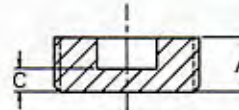
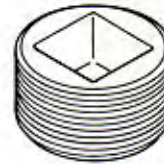
*Steel Only



CAST IRON COUNTERSUNK PLUGS

FIGURE 05

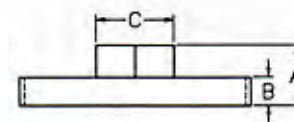
NPS	Thread Length A (min)	Nominal Size of Square B	Metal Thickness C
1 1/4"	0.800	.750	0.220
1 1/2"	0.830	.750	0.240
2"	0.880	.875	0.260
2 1/2"	1.070	1.125	0.290
3"	1.130	1.375	0.310
3 1/2"	1.180	1.500	0.340
4"	1.220	2.000	0.370



CAST IRON HEX HEAD CLEANOUT PLUGS *

FIGURE 06

NPS	Nominal Width Across Flats C	Thread Length B (min)	Overall Height A
1 1/4"	1.000	0.535	1.035
1 1/2"	1.000	0.525	1.025
2 1/2"	1.250	0.625	1.250
3"	1.400	0.685	1.370
4"	1.550	0.775	1.400

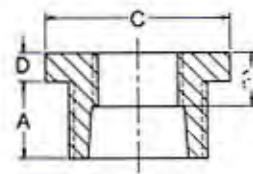
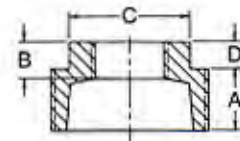


* Manufactured to WARD Specifications

CAST IRON HEX BUSHINGS

FIGURE 09

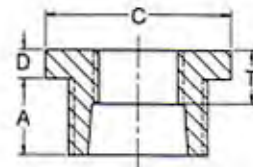
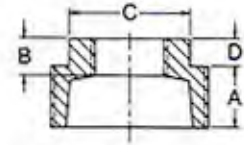
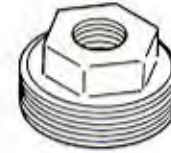
NPS	Length of External Threads A (min)	Length of Internal Threads B (min)	Width of Head C	Height of Head D	Inside or Outside Hex
1 1/4 x 3/4"	0.800	0.500	1.760	0.280	Outside
1 1/4 x 1/2"	0.800	0.430	1.340	0.340	Inside
1 1/4 x 3/8"	0.800	0.360	1.120	0.340	Inside
1 1/4 x 1/4"	0.800	0.320	1.120	0.340	Inside
1 1/4 x 1/8"	0.800	0.250	1.120	0.340	Inside
1 1/2 x 1"	0.830	0.580	2.000	0.310	Outside
1 1/2 x 3/4"	0.830	0.500	1.630	0.370	Inside
1 1/2 x 1/2"	0.830	0.430	1.340	0.370	Inside
1 1/2 x 3/8"	0.830	0.360	1.370	0.370	Inside
1 1/2 x 1/4"	0.830	0.320	2.000	0.370	Outside
1 1/2 x 1/8"	0.830	0.320	2.000	0.370	Outside
2 x 1 1/4"	0.880	0.670	2.480	0.340	Outside
2 x 1"	0.880	0.580	1.950	0.410	Inside
2 x 3/4"	0.880	0.500	1.630	0.410	Inside
2 x 1/2"	0.880	0.430	1.340	0.410	Inside
2 x 3/8"	0.880	0.360	1.120	0.410	Inside
2 x 1/4"	0.880	0.320	1.120	0.410	Inside
2 x 1/8"	0.880	0.250	1.120	0.410	Inside
2 1/2 x 1 1/2"	1.070	0.700	2.680	0.440	Outside
2 1/2 x 1 1/4"	1.070	0.670	2.390	0.440	Inside
2 1/2 x 1"	1.070	0.580	1.950	0.440	Inside
2 1/2 x 3/4"	1.070	0.500	1.630	0.440	Inside
2 1/2 x 1/2"	1.070	0.430	1.340	0.440	Inside
2 1/2 x 3/8"	1.070	0.360	1.340	0.440	Inside
3 x 2 1/2"	1.130	0.920	3.860	0.400	Outside
3 x 2"	1.130	0.750	3.280	0.480	Outside
3 x 1 1/2"	1.130	0.700	2.680	0.480	Inside
3 x 1 1/4"	1.130	0.670	2.390	0.480	Inside
3 x 1"	1.130	0.580	2.410	0.480	Inside
3 x 3/4"	1.130	0.500	2.400	0.480	Inside
3 x 1/2"	1.130	0.430	2.400	0.480	Inside
3 x 1/4"	1.130	0.320	2.410	0.480	Inside
3 1/2 x 2 1/2"	1.180	0.920	3.860	0.520	Outside
3 1/2 x 2"	1.180	0.750	3.280	0.520	Inside
3 1/2 x 1 1/2"	1.180	0.700	2.680	0.520	Inside
3 1/2 x 1 1/4"	1.180	0.670	2.390	0.520	Inside
3 1/2 x 1"	1.180	0.580	1.950	0.520	Inside
3 1/2 x 3/4"	1.180	0.500	1.950	0.520	Inside
3 1/2 x 1/2"	1.180	0.430	1.950	0.520	Inside
3 1/2 x 1/4"	1.180	0.320	1.950	0.520	Inside
4 x 3"	1.220	0.980	4.620	0.500	Outside
4 x 2 1/2"	1.220	0.920	3.860	0.600	Inside
4 x 2"	1.220	0.750	3.280	0.600	Inside
4 x 1 1/2"	1.220	0.700	2.680	0.600	Inside
4 x 1 1/4"	1.220	0.670	2.390	0.600	Inside
4 x 1"	1.220	0.580	2.420	0.600	Inside
4 x 3/4"	1.220	0.540	2.390	0.600	Inside
4 x 1/2"	1.220	0.500	1.950	0.600	Inside
5 x 4"	1.310	1.080	5.790	0.500	Outside
5 x 3 1/2"	1.310	1.030	5.790	0.600	Outside
5 x 3"	1.310	0.980	4.620	0.600	Outside
5 x 2 1/2"	1.310	0.920	3.860	0.600	Inside
5 x 2"	1.361	0.750	3.280	0.600	Inside
5 x 1 1/2"	1.310	0.700	3.280	0.600	Inside
6 x 5"	1.400	1.180	7.050	0.630	Outside
6 x 4"	1.400	1.080	5.790	0.750	Inside
6 x 3"	1.400	0.980	4.620	0.750	Inside
6 x 2 1/2"	1.400	0.920	3.860	0.750	Inside
6 x 2"	1.400	0.750	3.280	0.750	Inside
8 x 6"	1.570	1.280	8.280	0.830	Outside
8 x 5"	1.570	1.180	7.050	0.830	Outside
8 x 4"	1.570	1.080	5.790	0.830	Outside



CONTINUED ON NEXT PAGE

FIGURE 09

NPS	Length of External Threads A (min)	Length of Internal Threads B (min)	Width of Head C	Height of Head D	Inside or Outside Hex
1/4 x 1/8" *	0.440	0.260	0.640	0.140	Outside
3/8 x 1/4" *	0.480	0.400	0.680	0.160	Outside
3/8 x 1/8" *	0.480	0.250	0.680	0.160	Outside
1/2 x 3/8" *	0.560	0.410	0.870	0.190	Outside
1/2 x 1/4" *	0.560	0.320	0.870	0.190	Outside
1/2 x 1/8" *	0.560	0.250	0.870	0.190	Outside
3/4 x 1/2"	0.630	0.530	1.150	0.220	Outside
3/4 x 3/8"	0.630	0.360	1.150	0.220	Outside
3/4 x 1/4"	0.630	0.320	1.150	0.220	Outside
3/4 x 1/8"	0.630	0.250	1.150	0.220	Outside
1 x 3/4"	0.750	0.500	1.420	0.250	Outside
1 x 1/2"	0.750	0.430	1.420	0.250	Outside
1 x 3/8"	0.750	0.360	1.120	0.300	Inside
1 x 1/4"	0.750	0.320	1.420	0.300	Outside
1 x 1/8"	0.750	0.250	1.420	0.300	Outside
1 1/4 x 1"	0.800	0.580	1.760	0.280	Outside
1 1/2 x 1 1/4"	0.830	0.770	2.000	0.310	Outside
2 x 1 1/2"	0.880	0.700	2.480	0.340	Outside
2 x 1 1/4"	0.880	0.670	2.480	0.340	Outside
2 1/2 x 2"	1.070	0.750	2.980	0.370	Outside
3 1/2 x 3"	1.180	0.980	4.620	0.430	Outside
4 x 3 1/2"	1.220	1.030	5.200	0.500	Outside

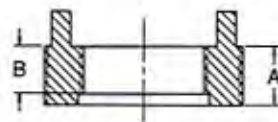


* Steel

CAST IRON FLUSH BUSHINGS

FIGURE 10

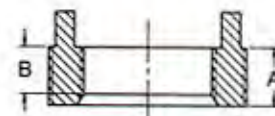
NPS	Length of External Threads A (min)	Length of Internal Threads B (min)
1/4 x 1/8" *	0.440	0.260
3/8 x 1/4" *	0.480	0.400
1/2 x 3/8" *	0.560	0.410
1/2 x 1/4" *	0.560	0.320
1/2 x 1/8" *	0.560	0.250
3/4 x 1/2" *	0.630	0.530
3/4 x 3/8" *	0.630	0.360
3/4 x 1/4" *	0.630	0.320
1 1/4 x 1/2"	0.800	0.430
1 1/2 x 1 1/4"	0.830	0.770
1 1/2 x 1"	0.830	0.580
1 1/2 x 3/4"	0.830	0.500
1 1/2 x 1/2"	0.830	0.430
2 x 1 1/2"	0.880	0.700
2 x 1 1/4"	0.880	0.670
2 x 1"	0.880	0.580
2 x 3/4"	0.880	0.500
2 x 1/2"	0.880	0.430
2 1/2 x 2"	1.070	0.750
2 1/2 x 1 1/2"	1.070	0.700
2 1/2 x 1 1/4"	1.070	0.670
3 x 2 1/2"	1.130	0.920
3 x 2"	1.130	0.750
3 x 1 1/2"	1.130	0.700
3 x 1 1/4"	1.130	0.670
3 1/2 x 2 1/2"	1.180	0.920
3 1/2 x 2"	1.180	0.750
3 1/2 x 1 1/2"	1.180	0.700
4 x 3 1/2"	1.220	1.030
4 x 3"	1.220	0.980
4 x 2 1/2"	1.220	0.920
4 x 2"	1.220	0.750
5 x 4"	1.310	1.080
5 x 3"	1.310	1.030
6 x 5"	1.400	1.180
6 x 4"	1.400	1.080
8 x 6"	1.570	1.280



MALLEABLE FLUSH BUSHINGS

FIGURE 10

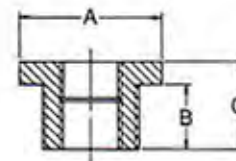
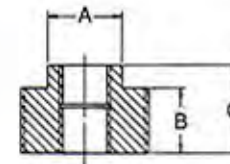
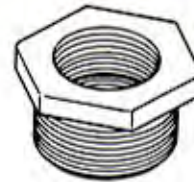
NPS	Length of External Thread A (min)	Length of Internal Threads B (min)
1 x 3/4"	0.750	0.500
1 x 1/2"	0.750	0.430
1 x 3/8"	0.750	0.360
1 x 1/4"	0.750	0.320
1 1/4 x 3/4"	0.800	0.500
1 1/4 x 1"	0.800	0.580
1 1/2 x 1 1/4"	0.830	0.770
2 x 1 1/2"	0.880	0.700
2 1/2 x 2"	1.070	0.750
4 x 3 1/2"	1.220	1.030



CAST IRON DOUBLE TAP TANK BUSHINGS *

FIGURE 13

NPS	Width of Head A (min)	Length of External Thd. B (min)	Overall Height C	Inside or Outside Hex
1 x 1/2 x 1/2"	1.460	1.163	1.572	Outside
1 1/2 x 1 x 1"	2.025	1.165	1.585	Outside
2 x 1 1/2 x 1 1/2"	3.100	1.335	1.770	Outside
2 x 1 1/4 x 1 1/4"	3.100	1.335	1.770	Outside
2 x 1 x 1"	2.550	1.165	1.575	Outside
2 x 3/4 x 3/4"	2.550	1.165	1.575	Outside
2 x 1/2 x 1/2"	2.550	1.165	1.575	Outside
2 x 3/8 x 3/8"	2.550	1.165	1.575	Outside
3 x 2 x 2"	3.910	1.725	2.315	Outside
3 x 1 x 1"	3.910	1.725	2.315	Outside
4 x 3 x 3"	4.675	1.725	2.305	Outside
4 x 2 1/2 x 2 1/2"	3.300	1.555	2.305	Outside
4 x 2 x 2"	3.300	1.555	2.305	Inside
4 x 1 1/2 x 1 1/2"	3.300	1.555	2.305	Inside
4 x 1 x 1"	3.300	1.555	2.305	Inside



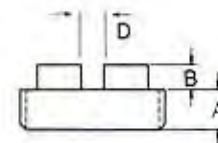
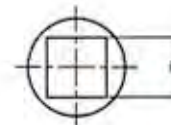
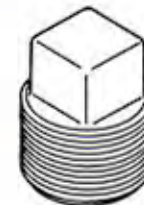
* Manufactured to WARD Specifications

SOLID PLUGS

FIGURE 03 & 04

NPS	Length of Thread A (min)	Height of Square B (min)	Nominal Width of Access Flats C	Distance between Lug D (min)
1/2"	0.560	0.280	9/16	---
3/4"	0.630	0.440	5/8	---
1"	0.750	0.500	13/16	---
1 1/4"	0.800	0.560	15/16	---
1 1/2"	0.830	0.620	1-1/8	---
2"	0.880	0.680	1-5/16	---
2 1/2"	1.070	0.740	1-1/2	---
3"	1.130	0.800	1-11/16	---
3 1/2"	1.180	0.860	1-7/8	---
+ 4"	1.220	1.000	---	7/8
+ 5"	1.310	1.000	---	7/8
+ 6"	1.400	1.250	---	1-1/4

+BAR HEAD

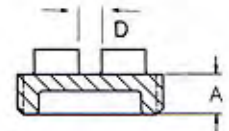
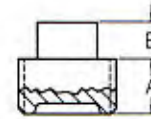
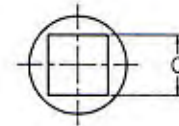


CAST IRON CORED PLUGS

FIGURE 01 & 02

NPS	Length of Thread A (min)	Height of Square B (min)	Nominal Width of Access Flats C	Distance between Lugs D (min)
*1/8"	0.370	0.240	9/32	---
*1/4"	0.440	0.280	3/8	---
*3/8"	0.480	0.310	7/16	---
1/2"	0.560	0.380	9/16	---
3/4"	0.630	0.440	5/8	---
1"	0.750	0.500	13/16	---
1 1/4"	0.800	0.560	15/16	---
1 1/2"	0.830	0.630	1-1/8	---
2"	0.880	0.680	1-5/16	---
2 1/2"	1.070	0.740	1-1/2	---
3"	1.130	0.800	1-11/16	---
3 1/2"	1.180	0.860	1 - 7/8	---
+ 4"	1.220	1.000	---	7/8
+ 5"	1.310	1.000	---	7/8
+ 6"	1.400	1.250	---	1-1/4

+Bar Head * Steel Only



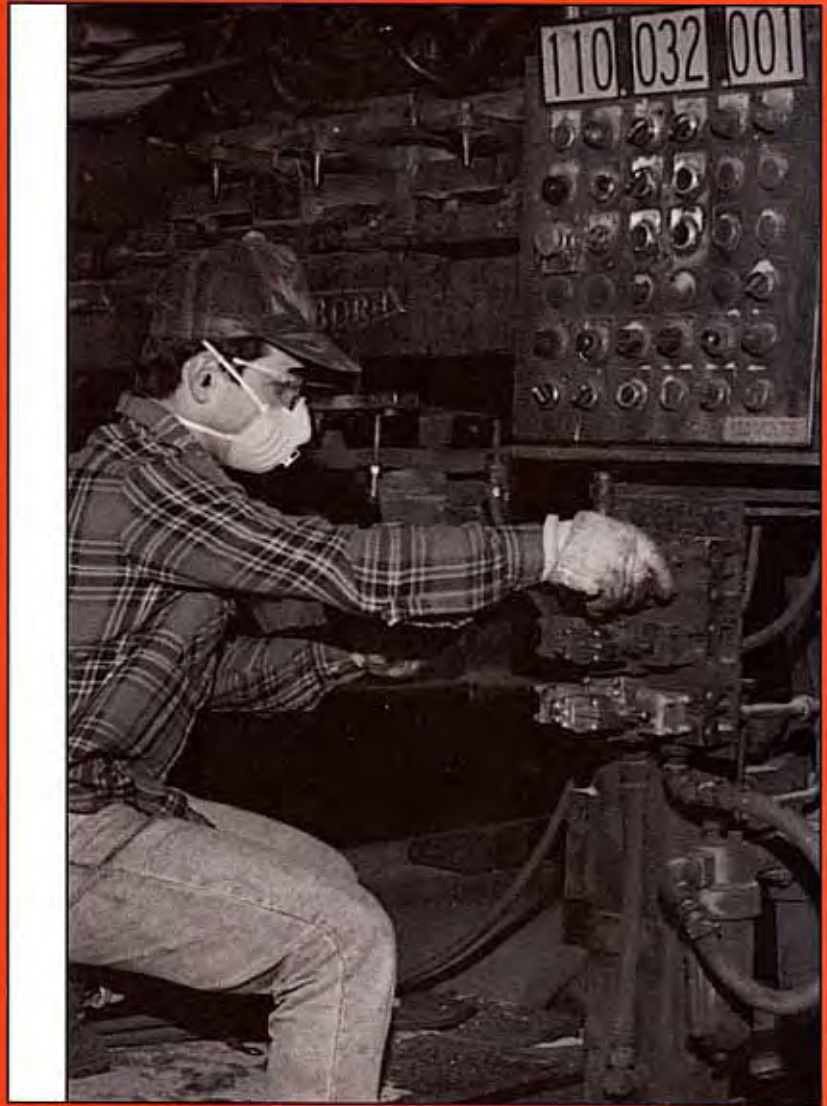
TOP BEAM CLAMPS AND "C" CLAMPS

Ward Top Beam Clamps and "C" Clamps are manufactured from Malleable iron with hardened steel cup point set screws and lock nuts. The finish is either black or galvanized.

Top Beam Clamps are recommended for use under roof installations with bar joist type construction, or for attachment to the top flange of structural shapes.

"C" Clamps are recommended for attachment to American Standard I-Beams and wide flange beams, where thickness of flange does not exceed .75 inches.

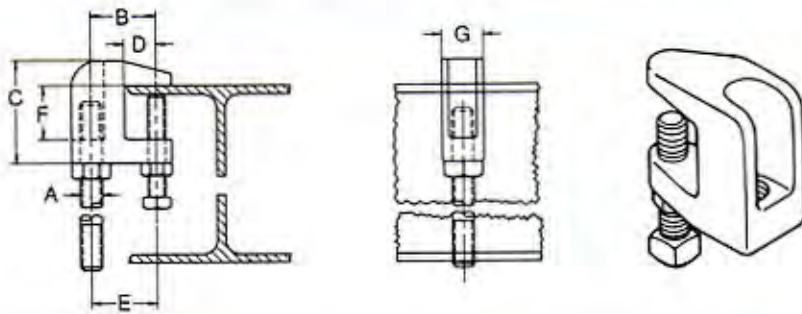
Care should be taken not to over tighten the set screw.



Material: ASTM A197
Dimensions: ANSI/ASME B 1.20.1
Coatings: ANSI/ASME B 633
ASTM A 153
Additional
Specifications: Federal Spec. WWP 521
UL, ULC AND FM, as applicable.
Federal specifications WWP 501

MALLEABLE IRON SMALL MOUTH TOP BEAM CLAMPS

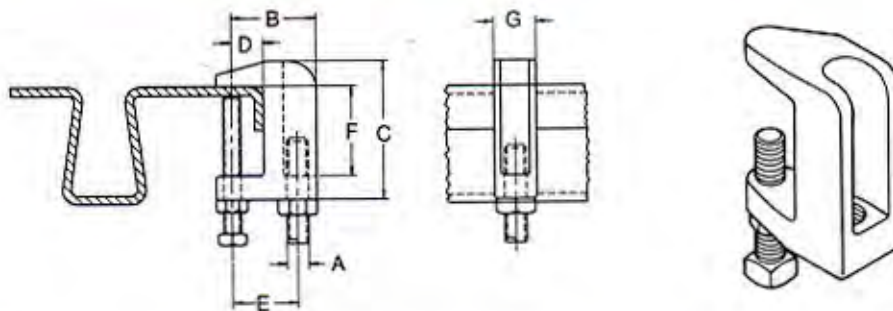
FIGURE 18



Dimensions, Inches											
Catalog No.	Rod Size	Thread Size	Recommended Pipe Size	Type	A	B	C	D	E	F	G
*38T	3/8"	3/8"-16NC	3/4"-4"	Small Mouth	.375	1.375	1.500	0.625	1.062	0.750	0.750
**12T	1/2"	1/2"-13NC	5"-8"	Small Mouth	.500	1.500	1.625	0.625	1.187	0.750	0.875

MALLEABLE IRON LARGE MOUTH TOP BEAM CLAMPS

FIGURE 18

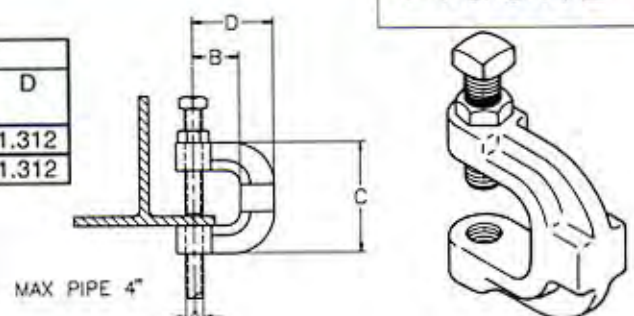


Dimensions, Inches											
Catalog No.	Rod Size	Thread Size	Recommended Pipe Size	Type	A	B	C	D	E	F	G
*38W	3/8"	3/8"-16NC	3/4"-4"	Large Mouth	.375	1.562	2.125	0.625	1.187	1.250	0.875
**12W	1/2"	1/2"-13NC	5"-8"	Large Mouth	.500	1.562	2.125	0.625	1.187	1.250	0.875

MALLEABLE IRON "C" CLAMPS

FIGURE 18

Dimensions, Inches							
Catalog No.	Rod Size	Thread Size	Recommended Pipe Size	A	B	C	D
38C	3/8"	3/8"-16NC	3/4"-2"	.375	0.625	1.750	1.312
12C	1/2"	1/2"-13NC	2 1/2"-4"	.500	0.625	1.750	1.312



STANDARD CAST IRON PIPE FITTINGS
CLASS 125

The iron from which Class 125 cast iron fittings are made is held to strict formula by careful chemical analysis and control.

Tapping is done on the most modern types of threading machines. All tapings are to USA Standards for iron pipe threads. Straightness and correct depth of threads assured through continuous capable inspection, by carefully trained inspectors.

Every fitting is hand sorted and inspected to eliminate defective castings.

WARD fittings are made to specifications as published by the American National Standards Institute (ANSI) for pipe fittings. They also conform to United States Federal Specifications.

A chamfer is cut or cast in all openings, permitting easy entrance of pipe and preventing damage to the first thread in handling and threading.

Because of the close attention paid to formula control together with the use of modern precision equipment we are able to produce castings of rugged strength and ability to make up tight.



TEMPERATURE-PRESSURE RATING

TEMP F	PSIG
-20 TO 150	175
200	165
250	150
300	140
350	125 (see note 1)
400	----

NOTES:

- 1) Permissible for service temperature up to 353° F reflecting temperature of saturated steam at 125 psig.
- 2) Permissible for service temperature up to 406° F reflecting temperature of saturated steam at 250 psig.

Size	O.D. of Band	Thread Length	Metal Thickness (min)
1/4"	.970	.360	.110
3/8"	1.160	.400	.120
1/2"	1.380	.470	.130
3/4"	1.670	.540	.150
1"	1.990	.620	.170
1 1/4"	2.430	.710	.180
1 1/2"	2.720	.740	.200
2"	3.320	.790	.220
1 1/2"	3.90	.960	.240
3"	4.660	1.020	.260
3 1/2"	5.240	1.070	.280
4"	5.830	1.120	.310

Material: ASTM A126 Class A Minimum for cast iron

Dimensions: ANSI B 16.1
ANSI B 1.20.1 for pipe threads

Pressure Ratings: ANSI/ASME B 16.1 for cast iron

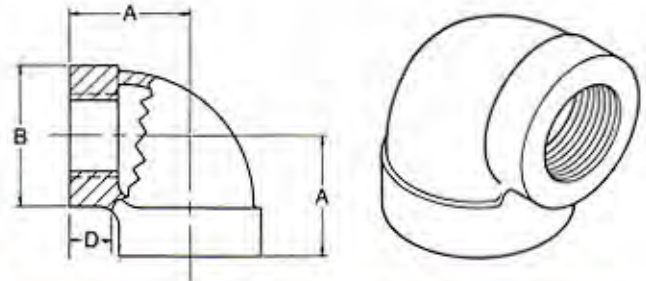
Coatings: ASTM (ANSI) A 153 for galvanizing

Additional Specifications: UL, ULC AND FM where applicable.
Federal specifications WWP 501

CAST IRON STRAIGHT 90° ELLS

FIGURE 21

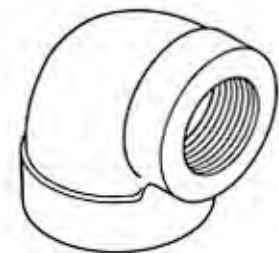
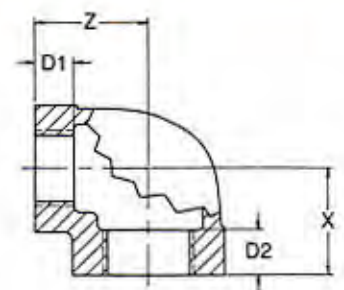
NPS	Center to End A	Outside Dia. of Band B (min)	Thread Length D (min)	Take Out Dimension
1/4"	0.810	0.930	0.320	0.435
3/8"	0.950	1.120	0.360	0.575
1/2"	1.120	1.340	0.430	0.558
3/4"	1.310	1.630	0.500	0.748
1"	1.500	1.950	0.580	0.813
1 1/4"	1.750	2.390	0.670	1.063
1 1/2"	1.940	2.680	0.700	1.253
2"	2.250	3.280	0.750	1.500
2 1/2"	2.700	3.860	0.920	1.763
3"	3.080	4.620	0.980	2.080
3 1/2"	3.420	5.200	1.030	2.358
4"	3.790	5.790	1.080	2.665



CAST IRON REDUCING 90° ELLS

FIGURE 22

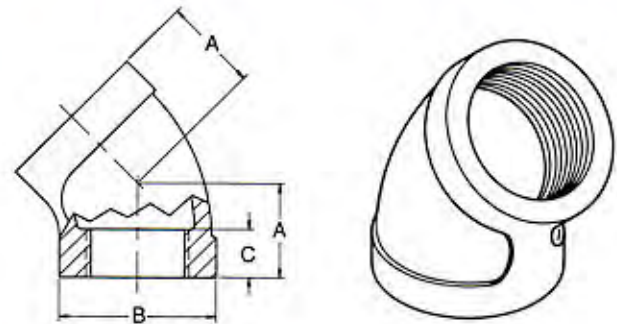
NPS	Center to End X	Center to End Z	Outside Dia. of Band B1(min)	Outside Dia. of Band B2(min)	Length of Thread D1(min)	Length of Thread D2(min)	Take Out	Take Out
1/2 x 3/8"	1.120	1.120	1.340	1.340	0.430	0.360	0.745	0.620
3/4 x 1/2"	1.200	1.220	1.630	1.340	0.500	0.430	0.700	0.658
3/4 x 3/8"	1.200	1.220	1.630	1.340	0.500	0.360	0.825	0.658
1 x 3/4"	1.370	1.450	1.950	1.630	0.580	0.500	0.808	0.762
1 x 1/2"	1.260	1.360	1.950	1.340	0.580	0.430	0.760	0.672
1 1/4 x 1"	1.580	1.670	2.390	1.950	0.670	0.580	0.893	0.982
1 1/4 x 3/4"	1.450	1.620	2.390	1.630	0.670	0.500	0.888	0.933
1 1/4 x 1/2"	1.340	1.530	2.390	1.340	0.670	0.430	0.840	0.843
1 1/2 x 1 1/4"	1.820	1.880	2.680	2.390	0.700	0.670	1.133	1.193
1 1/2 x 1"	1.650	1.800	2.680	1.950	0.700	0.580	0.963	1.113
1 1/2 x 3/4"	1.520	1.750	2.680	1.630	0.700	0.500	0.958	1.063
1 1/2 x 1/2"	1.520	1.750	2.680	1.630	0.700	0.430	1.020	1.063
2 x 1 1/2"	2.020	2.160	3.280	2.680	0.750	0.700	1.333	1.410
2 x 1 1/4"	1.900	2.100	3.280	2.390	0.750	0.670	1.213	1.350
2 x 1"	1.730	2.020	3.280	1.950	0.750	0.580	1.043	1.270
2 x 3/4"	1.600	1.970	3.280	1.630	0.750	0.500	1.168	1.220
2 x 1/2"	1.600	1.970	3.280	1.630	0.750	0.430	1.100	1.220
2 1/2 x 2"	2.390	2.600	3.860	3.280	0.920	0.750	1.640	1.663
2 1/2 x 1 1/2"	2.160	2.510	3.860	2.680	0.920	0.700	1.473	1.573
2 1/2 x 1 1/4"	2.040	2.450	3.860	2.390	0.920	0.670	1.353	1.513
2 1/2 x 1"	1.870	2.370	3.860	1.950	0.920	0.580	1.183	1.433
2 1/2 x 3/4"	1.870	2.370	3.860	1.950	0.920	0.500	1.308	1.433
3 x 2 1/2"	2.830	2.990	4.620	3.860	0.980	0.920	1.893	1.990
3 x 2"	2.520	2.890	4.620	3.280	0.980	0.750	1.770	1.890
3 x 1 1/2"	2.520	2.890	4.620	3.280	0.980	0.700	1.833	1.890
3 x 1 1/4"	2.170	2.740	4.620	2.390	0.980	0.670	1.483	1.740
3 x 1"	2.170	2.740	4.620	2.390	0.980	0.580	1.483	1.740
3 1/2 x 3"	3.420	3.420	5.200	5.200	1.030	0.980	2.420	2.358
4 x 3 1/2"	3.540	3.690	5.790	5.200	1.080	1.030	2.478	2.565
4 x 3"	3.300	3.600	5.790	4.620	1.080	0.980	2.300	2.475
4 x 2 1/2"	3.300	3.600	5.790	4.620	1.080	0.920	2.363	2.475
4 x 2"	2.740	3.410	5.790	3.280	1.080	0.750	1.990	2.285
4 x 1 1/2"	2.740	3.410	5.790	3.280	1.080	0.700	2.053	2.285



CAST IRON 45° ELLS

FIGURE 23

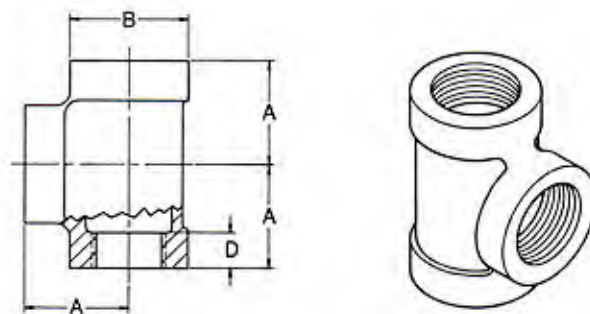
NPS	Center to End A	Outside Dia. of Band B (min)	Length of Thread C (min)	Take Out
1/2"	0.880	1.340	0.430	0.380
3/4"	0.980	1.630	0.500	0.418
1"	1.120	1.950	0.580	0.433
1 1/4"	1.290	2.390	0.670	0.603
1 1/2"	1.430	2.680	0.700	0.743
2"	1.680	3.280	0.750	0.930
2 1/2"	1.950	3.860	0.920	1.013
3"	2.170	4.620	0.980	1.170
3 1/2"	2.390	5.200	1.030	1.328
4"	2.610	5.790	1.080	1.485



CAST IRON STRAIGHT TEES

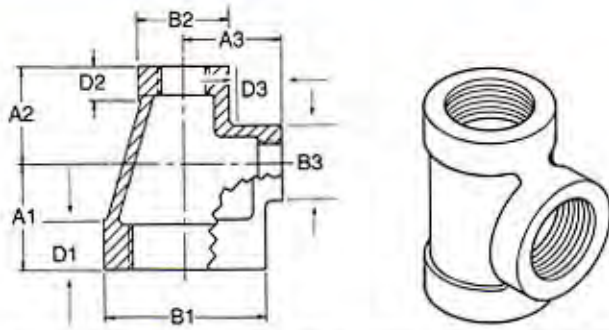
FIGURE 24

NPS	Center to End A	Outside Dia. of Band B (min)	Thread Length D (min)	Take Out Dim.
3/8"	0.950	1.120	0.360	0.575
1/2"	1.120	1.340	0.430	0.620
3/4"	1.310	1.630	0.500	0.748
1"	1.500	1.950	0.580	0.813
1 1/4"	1.750	2.390	0.670	1.063
1 1/2"	1.940	2.680	0.700	1.253
2"	2.250	3.280	0.750	1.500
2 1/2"	2.700	3.860	0.920	1.763
3"	3.080	4.620	0.980	2.080
3 1/2"	3.420	5.200	1.030	2.358
4"	3.790	5.790	1.080	2.665



CAST IRON REDUCING TEES

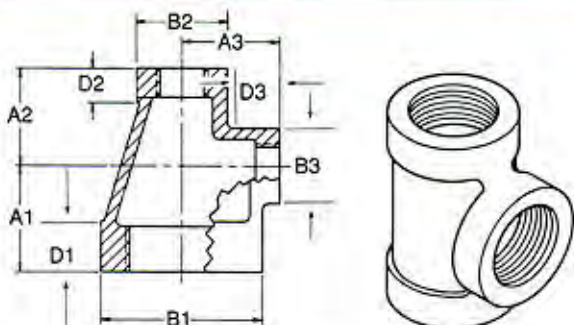
FIGURE 25



NPS H denotes Heel Ell	Center To End A1	Center To End A2	Center To End A3	Outside Dia. of Band B1(min)	Outside Dia. of Band B2(min)	Outside Dia. of Band B3(min)	Thread Length D1(min)	Thread Length D2(min)	Thread Length D3(min)	Take Out	Take Out	Take Out	
1/2 x 1/2 x 3/8	1.120	1.120	1.120	1.340	1.340	1.340	0.430	0.430	0.360	0.620	0.620	0.745	
1/2 x 3/8 x 1/2	1.120	1.120	1.120	1.340	1.340	1.340	0.430	0.360	0.430	0.620	0.745	0.620	
1/2 x 3/8 x 3/8	1.120	1.120	1.120	1.340	1.340	1.340	0.430	0.360	0.360	0.620	0.745	0.745	
3/8 x 3/8 x 1/2	1.120	1.120	1.120	1.340	1.340	1.340	0.360	0.360	0.430	0.745	0.745	0.620	
3/4 x 3/4 x 1/2	1.200	1.200	1.220	1.630	1.630	1.340	0.500	0.500	0.430	0.638	0.638	0.720	
3/4 x 3/4 x 3/8	1.200	1.200	1.220	1.630	1.630	1.340	0.500	0.500	0.360	0.638	0.638	0.845	
3/4 x 1/2 x 3/4	1.310	1.310	1.310	1.630	1.630	1.630	0.500	0.430	0.500	0.748	0.810	0.748	
3/4 x 1/2 x 1/2	1.200	1.120	1.220	1.630	1.340	1.340	0.500	0.430	0.430	0.638	0.620	0.720	
1/2 x 1/2 x 3/4	1.310	1.310	1.310	1.630	1.630	1.630	0.430	0.430	0.500	0.810	0.810	0.748	
1 x 1 x 3/4	1.370	1.370	1.450	1.950	1.950	1.630	0.580	0.580	0.500	0.683	0.763	0.888	
1 x 1 x 1/2	1.260	1.260	1.360	1.950	1.950	1.340	0.580	0.580	0.430	0.573	0.673	0.860	
1 x 1 x 3/8	1.260	1.260	1.360	1.950	1.950	1.340	0.580	0.580	0.360	0.573	0.673	0.985	
1 x 3/8 x 1	1.500	1.360	1.500	1.950	1.340	1.950	0.580	0.360	0.580	0.813	0.985	0.813	
1 x 3/4 x 1	1.500	1.450	1.500	1.950	1.630	1.950	0.580	0.500	0.580	0.813	0.888	0.813	
1 x 3/4 x 3/4	1.370	1.310	1.450	1.950	1.630	1.630	0.580	0.500	0.500	0.683	0.748	0.888	
1 x 3/4 x 1/2	1.260	1.260	1.360	1.950	1.950	1.340	0.580	0.500	0.430	0.573	0.698	0.860	
1 x 1/2 x 1	1.500	1.360	1.500	1.950	1.340	1.950	0.580	0.430	0.580	0.813	0.860	0.813	
1 x 1/2 x 3/4	1.370	1.310	1.450	1.950	1.630	1.630	0.580	0.430	0.500	0.683	0.810	0.888	
1 x 1/2 x 1/2	1.260	1.120	1.360	1.950	1.340	1.340	0.580	0.430	0.430	0.573	0.620	0.860	
1 x 1/4 x 1	1.500	1.200	1.500	1.950	0.930	1.950	0.580	0.320	0.580	0.813	0.825	0.813	
3/4 x 3/4 x 1	1.500	1.450	1.500	1.950	1.630	1.950	0.500	0.500	0.580	0.938	0.888	0.813	
3/4 x 1/2 x 1	1.500	1.360	1.500	1.950	1.340	1.950	0.500	0.500	0.580	0.938	0.860	0.813	
1 1/4 x 1 1/4 x 1	1.580	1.580	1.670	2.390	2.390	1.950	0.670	0.670	0.580	0.863	0.893	0.983	
1 1/4 x 1 1/4 x 3/4	1.450	1.450	1.620	2.390	2.390	1.630	0.670	0.670	0.500	0.763	0.763	1.058	
1 1/4 x 1 1/4 x 1/2	1.340	1.340	1.530	2.390	2.390	1.340	0.670	0.670	0.430	0.653	0.653	1.030	
1 1/4 x 1 x 1 1/4	1.750	1.670	1.750	2.390	1.950	2.390	0.670	0.580	0.670	1.063	0.983	1.063	
1 1/4 x 1 x 1	1.580	1.500	1.670	2.390	1.950	1.950	0.670	0.580	0.580	0.893	0.813	0.983	
1 1/4 x 1 x 3/4	1.450	1.370	1.620	2.390	1.950	1.630	0.670	0.580	0.500	0.763	0.683	1.058	
1 1/4 x 1 x 1/2	1.340	1.260	1.530	2.390	1.950	1.340	0.670	0.580	0.430	1.653	0.573	1.030	
1 1/4 x 3/4 x 1 1/4	1.750	1.620	1.750	2.390	1.630	2.390	0.670	0.500	0.670	1.063	1.058	1.063	
1 1/4 x 3/4 x 1	1.580	1.450	1.670	2.390	1.630	1.950	0.670	0.500	0.580	0.893	0.888	0.983	
1 1/4 x 3/4 x 3/4	1.450	1.310	1.620	2.390	1.630	1.630	0.670	0.500	0.500	0.763	0.748	1.058	
1 1/4 x 3/4 x 1/2	1.450	1.310	1.620	2.390	1.630	1.630	0.670	0.500	0.430	0.763	0.748	1.120	
1 1/4 x 1/2 x 1 1/4	1.750	1.530	1.750	2.390	1.340	2.390	0.670	0.430	0.670	1.063	1.030	1.063	
1 1/4 x 1/2 x 1	1.750	1.530	1.750	2.390	1.340	2.390	0.670	0.430	0.580	1.063	1.030	1.063	
1 1/4 x 1/2 x 3/8	1.580	1.450	1.450	2.390	1.340	1.120	0.670	0.430	0.360	0.893	0.950	1.075	
1 1/4 x 1/2 x 1/2	1.340	1.120	1.530	2.390	1.340	1.340	0.670	0.430	0.430	0.653	0.620	1.030	
1 1/4 x 1/2 x 3/4	1.450	1.310	1.620	2.390	1.630	1.630	0.670	0.430	0.500	0.763	0.810	1.058	
1 1/4 x 1/4 x 1 1/4	H	1.750	1.530	1.750	2.390	0.930	2.390	0.670	0.320	0.670	1.063	1.155	1.063
1 1/4 x 1/8 x 1 1/4	H	1.750	1.530	1.750	2.390	0.810	2.390	0.670	0.320	0.670	1.063	1.280	1.063
1 x 1 x 1 1/4	1.750	1.620	1.750	2.390	1.630	2.390	0.580	0.580	0.670	1.063	0.983	1.063	
1 x 3/4 x 1 1/4	1.750	1.620	1.750	2.390	1.630	2.390	0.580	0.500	0.670	1.063	1.058	1.063	
1 x 1/2 x 1 1/4	1.750	1.530	1.750	2.390	1.340	2.390	0.580	0.430	0.670	1.063	1.030	1.063	
1 1/2 x 1 1/2 x 1 1/4	1.820	1.820	1.880	2.680	2.680	2.390	0.700	0.700	0.670	1.133	1.133	1.193	
1 1/2 x 1 1/2 x 1	1.650	1.650	1.800	2.680	2.680	1.950	0.700	0.700	0.580	0.963	0.963	1.113	
1 1/2 x 1 1/2 x 3/4	1.520	1.520	1.750	2.680	2.680	1.630	0.700	0.700	0.500	0.833	0.833	1.188	
1 1/2 x 1 1/2 x 1/2	1.410	1.410	1.660	2.680	2.680	1.340	0.700	0.700	0.430	0.723	0.723	1.160	
1 1/2 x 1 1/2 x 3/8	1.410	1.410	1.660	2.680	2.680	1.340	0.700	0.700	0.360	0.723	0.723	1.285	
1 1/2 x 1 1/4 x 1/2	1.940	1.880	1.940	2.680	2.390	2.680	0.700	0.670	0.670	1.253	1.193	1.253	
1 1/2 x 1 1/4 x 1 1/4	1.820	1.750	1.880	2.680	2.390	2.390	0.700	0.670	0.670	1.133	1.063	1.193	

CAST IRON REDUCING TEES

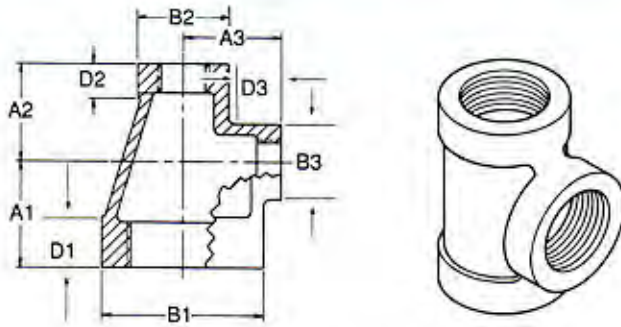
FIGURE 25



NPS H denotes Heel Ell	Center To End	Center To End	Center To End	Outside Dia. of Band B 1(min)	Outside Dia. of Band B 2(min)	Outside Dia. of Band B 3(min)	Thread Length	Thread Length	Thread Length	Take Out	Take Out	Take Out
	A1	A2	A3				D1(min)	D 2(min)	D 3(min)			
1 1/2 x 1 1/4 x 1	1.650	1.580	1.800	2.680	2.390	1.950	0.700	0.670	0.580	0.963	0.893	1.113
1 1/2 x 1 1/4 x 3/4	1.520	1.450	1.750	2.680	2.390	1.630	0.700	0.670	0.500	0.833	0.763	1.188
1 1/2 x 1 1/4 x 1/2	1.410	1.340	1.660	2.680	2.390	1.340	0.700	0.670	0.430	0.723	0.653	1.160
1 1/2 x 1 x 1 1/2	1.940	1.880	1.940	2.680	1.950	2.680	0.700	0.580	0.700	1.253	1.113	1.253
1 1/2 x 1 x 1 1/4	1.940	1.800	1.940	2.680	1.950	2.680	0.700	0.580	0.670	1.253	1.113	1.253
1 1/2 x 1 x 1	1.650	1.500	1.800	2.680	1.950	1.950	0.700	0.580	0.580	0.963	0.813	1.113
1 1/2 x 1 x 3/4	1.650	1.500	1.800	2.680	1.950	1.950	0.700	0.580	0.500	0.963	0.813	1.238
1 1/2 x 1 x 1/2	1.410	1.340	1.660	2.680	2.390	1.340	0.700	0.580	0.430	0.723	0.653	1.160
1 1/2 x 3/4 x 1 1/2	1.940	1.750	1.940	2.680	1.630	2.680	0.700	0.500	0.700	1.253	1.188	1.253
1 1/2 x 3/4 x 1 1/4	1.940	1.750	1.940	2.680	1.630	2.680	0.700	0.500	0.670	1.253	1.188	1.253
1 1/2 x 3/4 x 1	1.650	1.500	1.800	2.680	1.950	1.950	0.700	0.500	0.580	0.963	0.938	1.113
1 1/2 x 3/4 x 3/4	1.650	1.500	1.800	2.680	1.630	1.630	0.700	0.500	0.500	0.963	0.938	1.238
1 1/2 x 3/4 x 1/2	1.525	1.375	1.800	2.680	1.630	1.630	0.700	0.500	0.430	0.838	0.813	1.300
1 1/2 x 1/2 x 1 1/2	1.940	1.660	1.940	2.680	1.340	2.680	0.700	0.430	0.700	1.253	1.160	1.253
1 1/2 x 1/2 x 1 1/4	1.940	1.660	1.940	2.680	1.340	2.680	0.700	0.430	0.670	1.253	1.160	1.253
1 1/2 x 1/2 x 3/4	1.525	1.375	1.800	2.680	1.630	1.630	0.700	0.430	0.500	0.838	0.875	1.238
1 1/2 x 1/2 x 1/2	1.525	1.375	1.800	2.680	1.630	1.630	0.700	0.430	0.430	0.838	0.875	1.300
1 1/4 x 1 1/4 x 1 1/2	1.940	1.880	1.940	2.680	2.390	2.680	0.670	0.670	0.700	1.253	1.193	1.253
1 1/4 x 1 x 1 1/2	1.940	1.800	1.940	2.680	1.950	2.680	0.670	0.580	0.700	1.253	1.113	1.253
1 1/4 x 3/4 x 1 1/2	1.940	1.750	1.940	2.680	1.630	2.680	0.670	0.500	0.700	1.253	1.188	1.253
1 1/4 x 1/2 x 1 1/2	1.940	1.660	1.940	2.680	1.340	2.680	0.670	0.430	0.700	1.253	0.973	1.253
2 x 2 x 1 1/2	2.020	2.020	2.160	3.280	3.280	2.680	0.750	0.750	0.700	1.270	1.270	1.473
2 x 2 x 1 1/4	1.900	1.900	2.100	3.280	3.280	2.390	0.750	0.750	0.670	1.150	1.150	1.413
2 x 2 x 1	1.730	1.730	2.020	3.280	3.280	1.950	0.750	0.750	0.580	0.980	0.980	1.333
2 x 2 x 3/4	1.600	1.600	1.970	3.280	3.280	1.630	0.750	0.750	0.500	0.850	0.850	1.408
2 x 2 x 1/2	1.490	1.490	1.880	3.280	3.280	1.340	0.750	0.750	0.430	0.740	0.740	1.380
2 x 1 1/2 x 2	2.250	2.160	2.250	3.280	2.680	3.280	0.750	0.700	0.750	1.500	1.473	1.500
2 x 1 1/2 x 1 1/2	2.020	1.940	2.160	3.280	2.680	2.680	0.750	0.700	0.700	1.270	1.253	1.473
2 x 1 1/2 x 1 1/4	2.020	1.940	2.160	3.280	2.680	2.680	0.750	0.700	0.670	1.270	1.253	1.473
2 x 1 1/2 x 1	1.730	1.650	2.020	3.280	2.680	1.950	0.750	0.700	0.670	0.980	0.963	1.333
2 x 1 1/2 x 3/4	1.600	1.520	1.970	3.280	2.680	1.630	0.750	0.700	0.500	0.850	0.833	1.408
2 x 1 1/2 x 1/2	1.490	1.410	1.880	3.280	2.680	1.340	0.750	0.700	0.430	0.740	0.723	1.380
2 x 1 1/4 x 2	2.250	2.100	2.250	3.280	2.390	3.280	0.750	0.670	0.750	1.500	1.413	1.500
2 x 1 1/4 x 1 1/2	2.020	1.940	2.160	3.280	2.680	2.680	0.750	0.670	0.700	1.270	1.253	1.473
2 x 1 1/4 x 1 1/4	1.900	1.750	2.100	3.280	2.390	2.390	0.750	0.670	0.670	1.150	1.063	1.413
2 x 1 1/4 x 1	1.900	1.750	2.100	3.280	2.390	2.390	0.750	0.670	0.580	1.150	1.063	1.413
2 x 1 1/4 x 1/2	1.490	1.410	1.880	3.280	2.680	1.340	0.750	0.670	0.430	0.740	0.723	1.380
2 x 1 x 2	2.250	2.020	2.250	3.280	1.950	3.280	0.750	0.580	0.750	1.500	1.333	1.500
2 x 1 x 1 1/2	2.250	2.020	2.250	3.280	1.950	3.280	0.750	0.580	0.700	1.500	1.333	1.563
2 x 1 x 1 1/4	1.900	1.750	2.100	3.280	2.390	2.390	0.750	0.580	0.670	1.150	1.063	1.413
2 x 1 x 1	1.730	1.940	2.020	3.280	1.950	1.950	0.750	0.580	0.580	0.980	1.253	1.333
2 x 1 x 3/4	1.730	1.940	2.020	3.280	1.950	1.950	0.750	0.580	0.500	0.980	1.253	1.458
2 x 3/4 x 2	2.250	1.970	2.250	3.280	1.630	3.280	0.750	0.500	0.750	1.500	1.408	1.500
2 x 3/4 x 1 1/2	H 2.250	1.970	2.250	3.280	1.630	3.280	0.750	0.500	0.700	1.500	1.408	1.563
2 x 3/4 x 1 1/4	2.250	1.970	2.250	3.280	1.630	3.280	0.750	0.500	0.670	1.500	1.408	1.563
2 x 3/4 x 1	1.730	1.940	2.020	3.280	1.950	1.950	0.750	0.500	0.580	0.980	1.378	1.333
2 x 3/4 x 3/4	1.600	1.600	1.970	3.280	1.630	1.630	0.750	0.500	0.500	0.850	1.038	1.408
2 x 3/4 x 1/2	1.600	1.600	1.970	3.280	1.630	1.630	0.750	0.500	0.500	0.850	1.038	1.470
2 x 1/2 x 2	2.250	1.880	2.250	3.280	1.340	3.280	0.750	0.430	0.750	1.500	1.380	1.500
2 x 1/2 x 1 1/2	2.020	1.660	2.160	3.280	1.340	2.680	0.750	0.430	0.700	1.270	1.160	1.473

CAST IRON REDUCING TEES

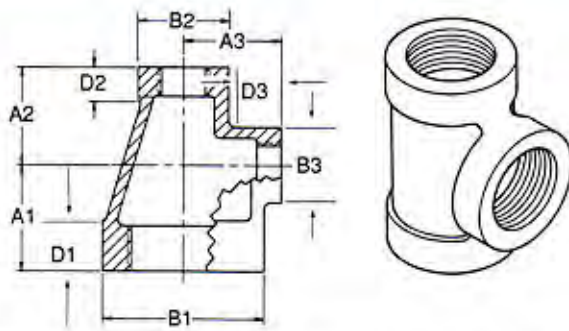
FIGURE 25



NPS H denotes Heel Ell	Center To End	Center To End	Center To End	Outside Dia. of Band B1(min)	Outside Dia. of Band B2(min)	Outside Dia. of Band B3(min)	Thread Length	Thread Length	Thread Length	Take Out	Take Out	Take Out
	A1	A2	A3				D1(min)	D2(min)	D3(min)			
2 x 1/2 x 1 1/4	1.730	1.730	2.020	3.280	1.340	2.680	0.750	0.430	0.670	1.270	1.160	1.473
2 x 1/2 x 3/4	1.600	1.600	1.970	3.280	1.630	1.630	0.750	0.430	0.500	0.850	1.100	1.408
2 x 1/2 x 1/2	1.600	1.600	1.970	3.280	1.630	1.630	0.750	0.430	0.430	0.850	1.100	1.470
1 1/2 x 1 1/2 x 2	2.160	2.160	2.020	2.680	2.680	3.280	0.700	0.700	0.750	1.473	1.473	1.270
1 1/2 x 1 1/4 x 2	2.250	2.100	2.250	3.280	2.390	3.280	0.700	0.670	0.750	1.563	1.413	1.500
1 1/2 x 1 x 2	2.250	2.020	2.250	3.280	1.950	3.280	0.700	0.580	0.750	1.563	1.333	1.500
2 1/2 x 2 1/2 x 2	2.390	2.390	2.600	3.860	3.860	3.280	0.920	0.920	0.750	1.453	1.453	1.850
2 1/2 x 2 1/2 x 1 1/2	2.160	2.160	2.510	3.860	3.860	2.680	0.920	0.920	0.700	1.223	1.223	1.823
2 1/2 x 2 1/2 x 1 1/4	2.040	2.040	2.450	3.860	3.860	2.390	0.920	0.920	0.670	1.103	1.103	1.763
2 1/2 x 2 1/2 x 1	1.870	1.870	2.370	3.860	3.860	1.950	0.920	0.920	0.580	0.933	0.933	1.683
2 1/2 x 2 1/2 x 3/4	1.870	1.870	2.370	3.860	3.860	1.950	0.920	0.920	0.500	0.933	0.933	1.808
2 1/2 x 2 1/2 x 1/2	1.870	1.870	2.370	3.860	3.860	1.950	0.920	0.920	0.430	0.933	0.933	1.870
2 1/2 x 2 x 2 1/2	2.700	2.600	2.700	3.860	3.280	3.860	0.920	0.750	0.920	1.763	1.850	1.763
2 1/2 x 2 x 2	2.390	2.250	2.600	3.860	3.280	3.280	0.920	0.750	0.750	1.453	1.500	1.850
2 1/2 x 2 x 1 1/2	2.390	2.250	2.600	3.860	3.280	3.280	0.920	0.750	0.700	1.453	1.500	1.913
2 1/2 x 2 x 1 1/4	2.040	1.900	2.450	3.860	3.280	2.390	0.920	0.750	0.670	1.103	1.150	1.763
2 1/2 x 2 x 1	2.040	1.900	2.450	3.860	3.280	2.390	0.920	0.750	0.580	1.103	1.150	1.763
2 1/2 x 2 x 3/4	1.870	1.870	2.370	3.860	3.860	1.950	0.920	0.750	0.580	0.933	1.120	1.808
2 1/2 x 2 x 1/2	1.630	1.490	2.230	3.860	3.280	1.340	0.920	0.750	0.430	0.693	0.740	1.730
2 1/2 x 1 1/2 x 2 1/2	2.700	2.510	2.700	3.860	2.680	3.860	0.920	0.700	0.920	1.763	1.823	1.763
2 1/2 x 1 1/2 x 2	2.390	2.250	2.600	3.860	3.280	3.280	0.920	0.750	0.750	1.453	1.563	1.850
2 1/2 x 1 1/2 x 1 1/2	2.160	1.940	2.510	3.860	2.680	2.680	0.920	0.700	0.700	1.223	1.253	1.823
2 1/2 x 1 1/2 x 1 1/4	2.040	1.900	2.450	3.860	3.280	2.390	0.920	0.700	0.670	1.103	1.213	1.763
2 1/2 x 1 1/2 x 1	1.630	1.490	2.230	3.860	3.280	1.340	0.920	0.700	0.430	0.693	0.803	1.730
2 1/2 x 1 1/4 x 2 1/2	2.700	2.450	2.700	3.860	2.390	3.860	0.920	0.670	0.920	1.763	1.763	1.763
2 1/2 x 1 1/4 x 2	2.700	2.450	2.700	3.860	2.390	3.860	0.920	0.670	0.750	1.763	1.763	1.950
2 1/2 x 1 1/4 x 1 1/2	2.160	1.940	2.510	3.860	2.680	2.680	0.920	0.670	0.700	1.223	1.253	1.823
2 1/2 x 1 1/4 x 1 1/4	2.040	1.900	2.450	3.860	2.390	2.390	0.920	0.670	0.670	1.103	1.213	1.763
2 1/2 x 1 1/4 x 1	2.140	2.120	2.510	3.860	2.390	2.390	0.920	0.670	0.580	1.203	1.433	1.823
2 1/2 x 1 x 2 1/2	2.700	2.450	2.700	3.860	2.390	3.860	0.920	0.580	0.920	1.763	1.763	1.763
2 1/2 x 1 x 2	2.700	2.450	2.700	3.860	2.390	3.860	0.920	0.580	0.700	1.763	1.763	1.950
2 1/2 x 1 x 1 1/4	2.140	2.120	2.510	3.860	2.390	2.390	0.920	0.580	0.670	1.203	1.433	1.823
2 1/2 x 1 x 1	1.940	1.750	2.370	3.860	1.950	1.950	0.920	0.580	0.580	1.003	1.063	1.683
2 1/2 x 1 x 3/4	1.940	1.750	2.370	3.860	1.950	1.950	0.920	0.580	0.500	1.003	1.063	1.808
2 1/2 x 3/4 x 2 1/2	2.700	2.320	2.700	3.860	1.630	3.860	0.920	0.500	0.920	1.763	1.758	1.763
2 1/2 x 3/4 x 2	H	2.700	2.320	2.700	3.860	1.630	0.920	0.500	0.750	1.763	1.758	1.950
2 1/2 x 3/4 x 1	1.940	1.750	2.370	3.860	1.950	1.950	0.920	0.500	0.580	1.003	1.188	1.683
2 1/2 x 3/4 x 3/4	1.940	1.750	2.370	3.860	1.950	1.950	0.920	0.500	0.500	1.003	1.188	1.808
2 1/2 x 1/2 x 2 1/2	H	2.700	2.230	2.700	3.860	1.340	0.920	0.430	0.920	1.763	1.730	1.763
2 1/2 x 1/2 x 2	H	2.700	2.600	2.700	3.860	1.340	0.920	0.430	0.750	1.763	2.100	1.950
2 x 2 x 2 1/2		2.600	2.600	2.390	3.280	3.280	0.750	0.750	0.920	1.850	1.850	1.453
2 x 1 1/2 x 2 1/2		2.600	2.600	2.390	3.280	3.280	0.750	0.700	0.920	1.850	1.913	1.453
2 x 1 1/4 x 2 1/2		2.700	2.450	2.700	3.860	2.390	0.750	0.670	0.920	1.950	1.763	1.763
2 x 1 x 2 1/2		2.700	2.450	2.700	3.860	2.390	0.750	0.580	0.920	1.950	1.763	1.763
2 x 3/4 x 2 1/2	H	2.700	2.320	2.700	3.860	1.630	0.750	0.500	0.920	1.950	1.758	1.763
1 1/2 x 1 1/2 x 2 1/2		2.510	2.510	2.160	2.680	2.680	0.700	0.700	0.920	1.823	1.823	1.223
3 x 3 x 2 1/2		2.830	2.830	2.990	4.620	4.620	0.980	0.980	0.920	1.830	1.830	2.053
3 x 3 x 2		2.520	2.520	2.890	4.620	4.620	0.980	0.980	0.750	1.520	1.520	2.140
3 x 3 x 1 1/2		2.520	2.520	2.890	4.620	4.620	0.980	0.980	0.700	1.520	1.520	2.203
3 x 3 x 1 1/4		2.170	2.170	2.740	4.620	4.620	0.980	0.980	0.670	1.170	1.170	2.053

CAST IRON REDUCING TEES

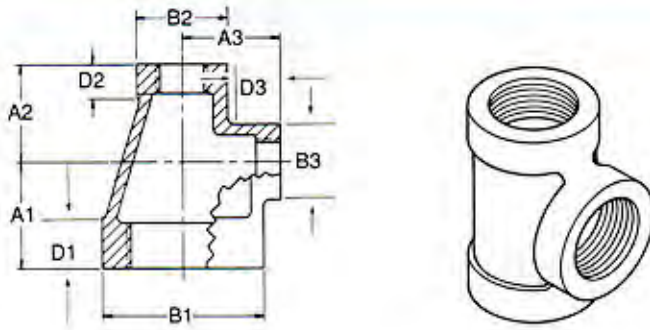
FIGURE 25



NPS H denotes Heel Ell	Center To End A1	Center To End A2	Center To End A3	Outside Dia. of Band B1(min)	Outside Dia. of Band B2(min)	Outside Dia. of Band B3(min)	Thread Length D1(min)	Thread Length D2(min)	Thread Length D3(min)	Take Out	Take Out	Take Out
3 x 3 x 1	2.000	2.000	2.660	4.620	4.620	1.950	0.980	0.980	0.580	1.000	1.000	1.973
3 x 2 1/2 x 3	3.080	2.990	3.080	4.620	3.860	4.620	0.980	0.920	0.980	2.080	2.053	2.080
3 x 2 1/2 x 2 1/2	2.830	2.700	2.990	4.620	3.860	3.860	0.980	0.920	0.920	1.830	1.763	2.053
3 x 2 1/2 x 2	2.830	2.700	2.990	4.620	3.860	3.860	0.980	0.920	0.750	1.830	1.763	2.240
3 x 2 1/2 x 1 1/4	2.170	2.170	2.740	4.620	4.620	2.390	0.980	0.920	0.670	1.170	1.233	2.053
3 x 2 x 3	3.080	2.890	3.080	4.620	3.280	4.620	0.980	0.750	0.980	2.080	2.140	2.080
3 x 2 x 2 1/2	3.080	2.890	3.080	4.620	3.280	4.620	0.980	0.750	0.920	2.080	2.140	2.143
3 x 2 x 2	2.520	2.250	2.890	4.620	3.280	3.280	0.980	0.750	0.750	1.520	1.500	2.140
3 x 2 x 1 1/2	2.520	2.250	2.890	4.620	3.280	3.280	0.980	0.750	0.700	1.520	1.500	2.203
3 x 1 1/2 x 3	3.080	2.890	3.080	4.620	3.280	4.620	0.980	0.700	0.980	2.080	2.203	2.080
3 x 1 1/2 x 2	2.520	2.250	2.890	4.620	3.280	3.280	0.980	0.700	0.750	1.520	1.563	2.140
3 x 1 1/2 x 1 1/2	2.520	2.250	2.890	4.620	3.280	3.280	0.980	0.700	0.700	1.520	1.563	2.203
3 x 1 1/4 x 3	H 3.080	2.740	3.080	4.620	2.390	4.620	0.980	0.670	0.980	2.080	2.053	2.080
3 x 1 1/4 x 2	H 2.520	2.700	2.890	4.620	2.390	3.280	0.980	0.670	0.750	1.520	2.013	2.140
3 x 1 x 3	H 3.080	2.740	3.080	4.620	1.950	4.620	0.980	0.580	0.980	2.080	2.053	2.080
3 x 1 x 2	H 2.520	2.630	2.890	4.620	1.950	3.280	0.980	0.580	0.750	1.520	1.943	2.140
3 x 3/4 x 3	H 3.080	2.610	3.080	4.620	1.630	4.620	0.980	0.500	0.980	2.080	2.048	2.080
1 1/2 x 1 1/2 x 3	2.830	2.830	2.275	2.680	2.680	4.620	0.700	0.700	0.980	2.143	2.143	1.275
2 x 2 x 3	3.080	2.890	3.080	4.620	3.280	4.620	0.750	0.750	0.980	2.330	2.140	2.080
2 1/2 x 2 1/2 x 3	3.080	2.990	3.080	4.620	3.860	4.620	0.920	0.920	0.980	2.143	2.053	2.080
2 1/2 x 2 x 3	3.080	2.890	3.080	4.620	3.280	4.620	0.920	0.750	0.980	2.143	2.140	2.080
3 1/2 x 3 1/2 x 4	3.790	3.790	3.790	5.790	5.790	5.790	1.030	1.030	1.080	2.728	2.728	2.665
3 1/2 x 3 1/2 x 3	3.420	3.420	3.420	5.200	5.200	5.200	1.030	1.030	0.980	2.358	2.358	2.420
3 1/2 x 3 1/2 x 2 1/2	2.930	2.930	3.240	5.200	5.200	3.860	1.030	1.030	0.920	1.868	1.868	2.303
3 1/2 x 3 1/2 x 2	2.620	2.620	3.140	5.200	5.200	3.280	1.030	1.030	0.750	1.558	1.558	2.390
3 1/2 x 3 1/2 x 1 1/2	2.390	2.390	3.050	5.200	5.200	2.680	1.030	1.030	0.700	1.703	1.328	2.363
3 1/2 x 3 1/2 x 1 1/4	2.270	2.270	2.990	5.200	5.200	2.390	1.030	1.030	0.670	1.208	1.208	2.303
3 1/2 x 3 1/2 x 1	2.100	2.100	2.910	5.200	5.200	1.950	1.030	1.030	0.580	1.038	1.038	2.223
3 1/2 x 3 x 3 1/2	3.420	3.420	3.420	5.200	5.200	5.200	1.030	0.980	1.030	2.358	2.420	2.358
3 1/2 x 3 x 3	3.420	3.420	3.420	5.200	5.200	5.200	1.030	0.980	0.980	2.358	2.420	2.420
3 1/2 x 3 x 2 1/2	2.930	2.830	3.240	5.200	4.620	3.860	1.030	0.980	0.920	1.868	1.830	2.303
3 1/2 x 3 x 2	2.620	2.520	3.140	5.200	4.620	3.280	1.030	0.980	0.750	1.558	1.520	2.390
3 1/2 x 3 x 1 1/2	2.390	2.290	3.050	5.200	4.620	3.860	1.030	0.980	0.750	1.328	1.290	2.363
3 1/2 x 3 x 1 1/4	2.390	2.290	3.050	5.200	4.620	2.390	1.030	0.980	0.670	1.328	1.290	2.363
3 1/2 x 1 1/4 x 3 1/2	H 3.420	2.990	3.420	5.200	2.390	5.200	1.030	0.670	1.030	2.358	2.303	2.733
3 1/2 x 1 x 3 1/2	H 3.420	2.910	3.420	5.200	1.950	5.200	1.030	0.580	1.030	2.358	2.223	2.358
3 x 3 x 3 1/2	3.420	3.420	3.420	5.200	5.200	5.200	0.980	0.980	1.030	2.420	2.420	2.358
4 x 4 x 3 1/2	3.790	3.790	3.790	5.790	5.790	5.790	1.080	1.080	1.030	2.665	2.665	2.728
4 x 4 x 3	3.300	3.300	3.600	5.790	5.790	5.200	1.080	1.080	0.980	2.175	2.175	2.600
4 x 4 x 2 1/2	3.050	3.050	3.510	5.790	5.790	3.860	1.080	1.080	0.920	1.925	1.925	2.760
4 x 4 x 2	2.740	2.740	3.410	5.790	5.790	3.280	1.080	1.080	0.750	1.615	1.615	2.660
4 x 4 x 1 1/2	2.740	2.740	3.410	5.790	5.790	3.280	1.080	1.080	0.700	1.615	1.615	2.723
4 x 3 1/2 x 4	3.790	3.790	3.790	5.790	5.790	5.790	1.080	1.030	1.080	2.665	2.728	2.665
4 x 3 x 4	3.790	3.600	3.790	5.790	4.620	5.790	1.080	0.980	1.080	2.665	2.600	2.665
4 x 2 1/2 x 4	3.790	3.510	3.790	5.790	3.860	5.790	1.080	0.920	1.080	2.665	2.573	2.665
4 x 2 x 4	3.790	3.410	3.790	5.790	3.280	5.790	1.080	0.750	1.080	2.665	2.660	2.665
4 x 1 1/2 x 4	3.790	3.410	3.790	5.790	3.280	5.790	1.080	0.700	1.080	2.665	2.723	2.665
4 x 1 1/4 x 4	H 3.790	3.260	3.790	5.790	2.390	5.790	1.080	0.670	1.080	2.665	2.573	2.665
4 x 1 x 4	H 3.790	3.180	3.790	5.790	1.950	5.790	1.080	0.580	1.080	2.665	2.493	2.665
4 x 3 1/2 x 3 1/2	3.790	3.790	3.790	5.790	5.790	5.790	1.080	1.030	1.030	2.665	2.728	2.728

CAST IRON REDUCING TEES

FIGURE 25

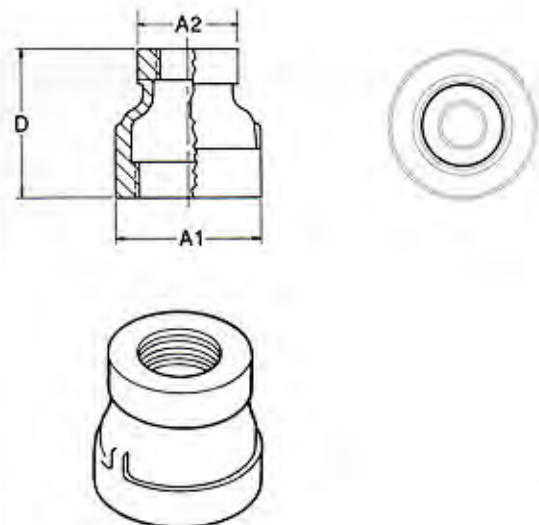


NPS H denotes Heel Ell	Center To End A1	Center To End A 2	Center To End A 3	Outside Dia. of Band B1(min)	Outside Dia. of Band B 2(min)	Outside Dia. of Band B 3(min)	Thread Length D1(min)	Thread Length D2(min)	Thread Length D3(min)	Take Out	Take Out	Take Out
4 x 3 1/2 x 3	3.300	3.300	3.600	5.790	5.200	4.620	1.080	1.030	0.980	2.175	2.238	2.600
4 x 3 1/2 x 2 1/2	3.050	3.050	3.510	5.790	5.790	3.860	1.080	1.030	0.920	1.925	1.988	2.573
4 x 3 1/2 x 2	2.740	2.620	3.410	5.790	5.200	3.280	1.080	1.030	0.750	1.615	1.558	2.660
4 x 3 1/2 x 1 1/2	2.510	2.390	3.320	5.790	5.200	2.680	1.080	1.030	0.700	1.385	1.328	2.663
4 x 3 x 3 1/2	3.790	3.690	3.790	5.790	3.860	5.790	1.080	0.980	1.030	2.665	2.690	2.728
4 x 3 x 3	3.540	3.420	3.690	5.790	4.620	4.620	1.080	0.980	0.980	2.415	2.420	2.690
4 x 3 x 2 1/2	3.300	3.080	3.600	5.790	4.620	3.860	1.080	0.980	0.920	2.175	2.080	2.663
4 x 3 x 2	2.740	2.620	3.410	5.790	5.200	3.280	1.080	0.980	0.750	1.615	1.620	2.660
4 x 3 x 1 1/2	2.510	2.390	3.320	5.790	5.200	2.680	1.080	0.980	0.700	1.385	1.390	2.633
4 x 2 1/2 x 3	3.300	3.080	3.600	5.790	3.860	3.860	1.080	0.920	0.980	2.175	2.143	2.600
4 x 2 1/2 x 2 1/2	3.050	2.700	3.510	5.790	3.280	3.280	1.080	0.920	0.920	1.925	1.763	2.573
4 x 2 1/2 x 2	3.050	2.700	3.510	5.790	3.860	3.860	1.080	0.920	0.750	1.925	1.763	2.760
4 x 2 x 2	2.740	2.250	3.410	5.790	3.280	3.280	1.080	0.750	0.750	1.615	1.500	2.660
4 x 2 x 1 1/2	2.740	2.250	3.410	5.790	3.280	3.280	1.080	0.750	0.700	1.615	1.500	2.723
4 x 1 1/2 x 2	2.740	2.250	3.410	5.790	3.280	3.280	1.080	0.700	0.750	1.615	1.563	2.660
4 x 1 1/2 x 1 1/2	2.740	2.250	3.410	5.790	1.950	5.790	1.080	0.700	0.700	1.615	1.563	2.723

CAST IRON REDUCING COUPLINGS

FIGURE 29

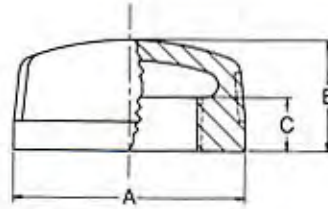
NPS **Hex Head	Outside Dia. of Band A1 (min)	Outside Dia. of Band A2 (min)	Take Out	Take Out	Length of Fitting D'
1 x 3/4***	1.990	1.625	0.270	0.350	1.700
1 x 1/2***	1.990	1.313	0.270	0.420	1.700
1 1/4 x 1"	2.390	1.950	0.395	0.485	2.130
1 1/4 x 3/4"	2.390	1.950	0.395	0.565	2.130
1 1/2 x 1 1/4"	2.680	2.390	0.425	0.455	2.250
1 1/2 x 1"	2.680	2.390	0.425	0.545	2.250
2 x 1 1/2"	3.280	2.680	0.410	0.460	2.320
2 x 1 1/4"	3.280	2.390	0.445	0.525	2.390
2 x 1"	3.280	1.950	0.410	0.580	2.320
2 x 3/4"	3.280	1.630	0.410	0.660	2.320
2 x 1/2"	3.280	1.630	0.410	0.730	2.320
2 1/2 x 2"	3.860	3.280	0.395	0.565	2.630
2 1/2 x 1 1/2"	3.860	3.280	0.395	0.615	2.630
3 x 2"	4.620	3.280	0.460	0.690	2.880
3 x 1 1/2"	4.620	3.280	0.460	0.740	2.880



CAST IRON PIPE CAPS

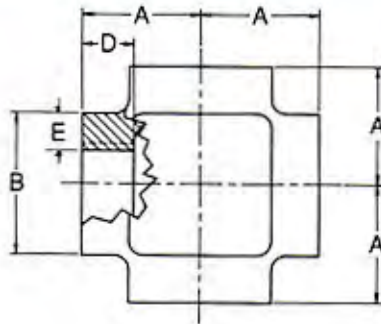
FIGURE 30

NPS	Outside Diameter A (min)	Overall Height B	Thread Length C (min)
2 1/2"	3.860	1.810	0.920
3"	4.620	1.910	0.980
3 1/2"	5.200	2.030	1.030
4"	5.790	2.220	1.080
5"	7.050	2.380	1.180
6"	8.280	2.630	1.280



CAST IRON CROSS

FIGURE 30A



NPS	Center to End A	Outside Dia. Band B (min)	Length of Thread D (min)	Metal Thickness E	Take Out Dimension
1/2"	1.250	1.340	0.430	0.160	0.820
3/4"	1.440	1.630	0.500	0.180	0.940
1"	1.630	1.950	0.580	0.200	1.050
1 1/4"	1.940	2.390	0.670	0.220	1.270
1 1/2"	2.130	2.680	0.700	0.240	1.430
2"	2.500	3.280	1.750	0.260	1.750

SECTION 7

FLANGES, FLANGE UNIONS, COMPANION FLANGES, FLANGED FITTINGS

WARD flanged components are made with high quality iron and are designed to handle the tough service that flanged components normally experience. Precision machining and thread chamfering allows WARD flanged components to be easily installed. Most importantly, quality is built into the design, material and manufacturing of each of WARD's flanged components.

Cast Iron flanges may have either a black or galvanized finish.



	FLANGES		HUB	BLIND FLANGES	BOLT HOLES			BOLTING			
NPS	Diameter of Flange O	Thickness of Flange, Min. Q	Diameter of Hub, Min. X	Length of Hub & Threads, Min. Y	Diameter of Port I	Wall Thickness V	Diameter of Bolt Circle	Diameter of Bolt Holes	Number of Bolts	Dia. of Bolts	Length of Bolts
1	4.25	0.44	1.94	0.69	1.00	0.38	3.12	0.62	4	0.50	2.00
1 1/4	4.62	0.50	2.31	0.81	1.25	0.44	3.50	0.62	4	0.50	2.00
1 1/2	5.00	0.56	2.56	0.88	1.50	0.50	3.88	0.62	4	0.50	2.00
2	6.00	0.62	3.06	1.00	2.00	0.56	4.75	0.75	4	0.62	2.50
2 1/2	7.00	0.69	3.56	1.12	2.50	0.63	5.50	0.75	4	0.62	2.50
3	7.50	0.75	4.25	1.19	3.00	0.69	6.00	0.75	4	0.62	2.50
3 1/2	8.50	0.81	4.81	1.25	3.50	0.75	7.00	0.75	8	0.62	3.00
4	9.00	0.94	5.31	1.31	4.00	0.88	7.50	0.75	8	0.62	3.00
5	10.00	0.94	6.44	1.44	5.00	0.88	8.50	0.88	8	0.75	3.00
6	11.00	1.00	7.56	1.56	6.00	0.94	9.50	0.88	8	0.75	3.50
8	13.50	1.12	9.69	1.75	8.00	1.06	11.75	0.88	8	0.75	3.50
10	16.00	1.19	11.94	1.94	10.00	1.12	14.25	1.00	12	0.88	4.00
12	19.00	1.25	14.06	2.19	12.00	0.81	17.00	1.00	12	0.88	4.00

Material: ASTM A126, B307

Dimensions: ANSI / ASME B 16.1
ANSI / ASME B 1.20.1

Coatings: ASTM A 153

Additional Specifications: Federal Spec. WW-F-406
UL, FM as listed where applicable

FLANGES, FLANGE UNIONS, COMPANION FLANGES, FLANGED FITTINGS

WARD flanged components are made with high quality iron and are designed to handle the tough service that flanged components normally experience. Precision machining and thread chamfering allows WARD flanged components to be easily installed. Most importantly, quality is built into the design, material and manufacturing of each of WARD's flanged components.

Cast Iron flanges may have either a black or galvanized finish.



	FLANGES		HUB	BLIND FLANGES	BOLT HOLES			BOLTING			
NPS	Diameter of Flange O	Thickness of Flange, Min. Q	Diameter of Hub, Min. X	Length of Hub & Threads, Min. Y	Diameter of Port I	Wall Thickness V	Diameter of Bolt Circle	Diameter of Bolt Holes	Number of Bolts	Dia. of Bolts	Length of Bolts
1	4.25	0.44	1.94	0.69	1.00	0.38	3.12	0.62	4	0.50	2.00
1 1/4	4.62	0.50	2.31	0.81	1.25	0.44	3.50	0.62	4	0.50	2.00
1 1/2	5.00	0.56	2.56	0.88	1.50	0.50	3.88	0.62	4	0.50	2.00
2	6.00	0.62	3.06	1.00	2.00	0.56	4.75	0.75	4	0.62	2.50
2 1/2	7.00	0.69	3.56	1.12	2.50	0.63	5.50	0.75	4	0.62	2.50
3	7.50	0.75	4.25	1.19	3.00	0.69	6.00	0.75	4	0.62	2.50
3 1/2	8.50	0.81	4.81	1.25	3.50	0.75	7.00	0.75	8	0.62	3.00
4	9.00	0.94	5.31	1.31	4.00	0.88	7.50	0.75	8	0.62	3.00
5	10.00	0.94	6.44	1.44	5.00	0.88	8.50	0.88	8	0.75	3.00
6	11.00	1.00	7.56	1.56	6.00	0.94	9.50	0.88	8	0.75	3.50
8	13.50	1.12	9.69	1.75	8.00	1.06	11.75	0.88	8	0.75	3.50
10	16.00	1.19	11.94	1.94	10.00	1.12	14.25	1.00	12	0.88	4.00
12	19.00	1.25	14.06	2.19	12.00	0.81	17.00	1.00	12	0.88	4.00

Material: ASTM A126, B307

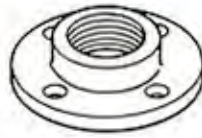
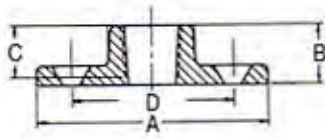
Dimensions: ANSI / ASME B 16.1
ANSI / ASME B 1.20.1

Coatings: ASTM A 153

Additional Specifications: Federal Spec. WW-F-406
UL, FM as listed where applicable

CAST IRON AND MALLEABLE IRON FLOOR FLANGE *

FIGURE 15

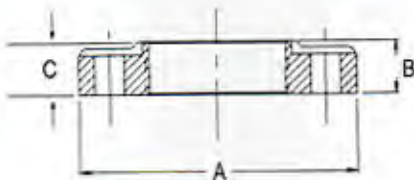


Size	Outside Diameter A	Length B (min)	Length of Thread C (min)	Number of Bolt Holes	Bolt Hole Size	Bolt Circle D
1/4 x 2 3/8	2.375	0.460	0.320	3	0.190	2.810
3/8 x 2 15/16	2.938	0.525	0.360	4	0.270	2.400
1/2 x 3 1/4	3.000	0.650	0.430	4	0.240	2.100
3/4 x 3 1/4	3.250	0.650	0.500	4	0.250	2.310
1 x 3 7/8	3.875	0.775	0.580	4	0.270	3.000
1 1/4 x 3 7/8	3.875	0.775	0.670	4	0.270	3.000
1 1/2 x 4 1/2	4.500	0.990	0.700	4	0.300	3.600
2 x 5 1/2	5.500	1.000	0.750	4	0.390	4.250
2 1/2 x 5 13/16	5.812	1.060	0.920	4	0.330	4.790
3 x 6 3/8	6.375	1.100	0.980	6	0.310	5.180
4 x 7 15/16	7.938	1.100	1.050	5	0.380	6.700

* Manufactured to WARD Specifications

STANDARD FLANGE UNIONS *WORKING PRESSURE 175 PSI

FIGURE 14

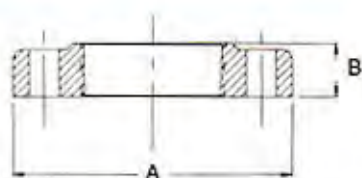


	Outside Diameter	Length	Flange Thickness	Number of Bolt Holes
SIZE	A	B	C	
1/2	2.812	0.625	0.438	3
3/4	3.438	0.750	0.438	3
1	3.500	0.750	0.438	3
1 1/4	4.062	0.750	0.438	4
1 1/2	4.375	0.812	0.438	4
2	5.125	1.000	0.500	4
2 1/2	6.620	1.250	0.625	4
3	6.688	1.250	0.625	4
3 1/2	7.250	1.250	0.625	4
4	7.812	1.375	0.688	5
5	9.438	1.438	0.750	5
6	10.562	1.500	1.000	6
8	13.500	1.750	1.188	7

* Manufactured to WARD Specifications

EXTRA HEAVY FLANGES * WORKING PRESSURE 400 PSI

	Dia. of Flange	Overall Height	Length of Thread	Bolt Holes
SIZE	A	B	C	
2	5.500	1.062	0.812	5
2 1/2	6.000	1.062	0.812	5
3	6.812	1.188	0.812	6
4	8.188	1.250	0.750	7



* Manufactured to WARD Specifications



FIGURE 73

CAST IRON COMPANION FLANGES

NPS	Diameter of Flange A	Thickness Flange B (min)	Dia. of Hub C (min)	Length of Hub & Thd D (min)	Bolt Holes
1	4.250	0.440	1.940	0.690	4
1 1/4	4.620	0.500	2.310	0.810	4
1 1/2	5.000	0.560	2.560	0.880	4
2	6.000	0.620	3.060	1.000	4
2 1/2	7.000	0.690	3.560	1.120	4
3	7.500	0.750	4.250	1.190	4
3 1/2	8.500	0.810	4.810	1.250	8
4	9.000	0.940	5.310	1.310	8
5	10.000	0.940	6.440	1.440	8
6	11.000	1.000	7.560	1.560	8
8	13.500	1.120	9.690	1.750	8
10	16.000	1.190	11.940	1.940	12



FIGURE 20

CAST IRON BLIND FLANGES

NPS	Dia. of Flange A	Thickness of Flange B (min)	Wall Thickness C	Diameter of Port D	Bolt Holes
1	4.250	0.440	0.380	1.000	4
1 1/4	4.620	.5000	0.440	1.250	4
1 1/2	5.000	0.560	0.500	1.500	4
2	6.000	0.620	0.560	2.000	4
2 1/2	7.000	0.690	0.630	2.500	4
3	7.500	0.750	0.690	3.000	4
3 1/2	8.500	0.810	0.750	3.500	8
4	9.000	0.940	0.880	4.000	8
5	10.000	0.940	0.880	5.000	8
6	11.000	1.000	0.940	6.000	8
8	13.500	1.120	1.060	8.000	8
10	16.000	1.190	1.120	10.000	12

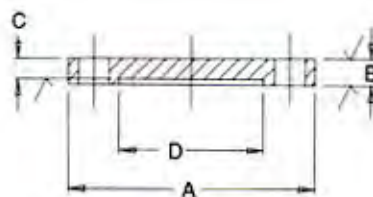
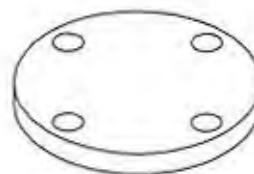
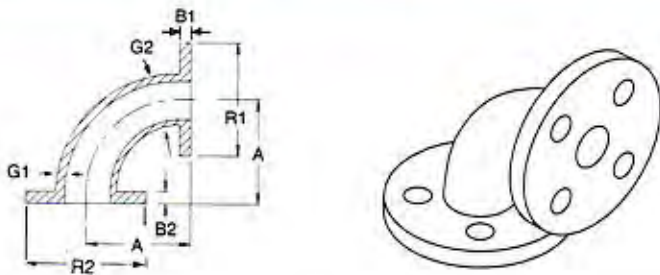


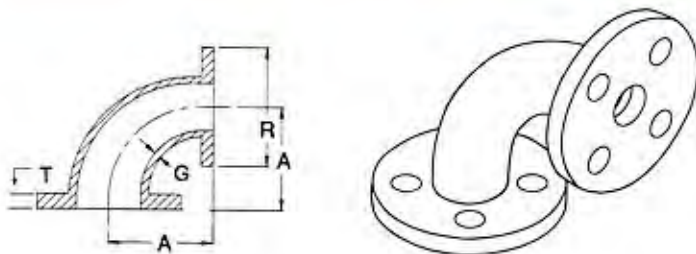
FIGURE 19

CAST IRON FLANGED REDUCING 90° ELLS *



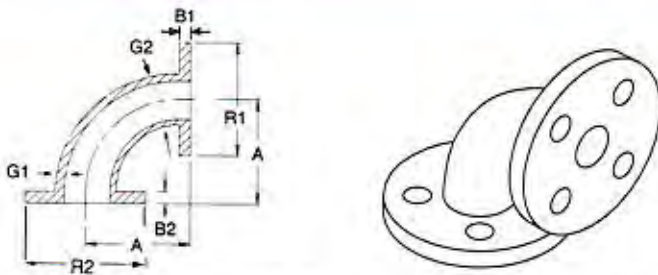
NPS	Center to Face A	1st Flange Diameter R1	2nd Flange Diameter R2	1st Flange Thickness B1	2nd Flange Thickness B2	1st Wall Thickness G1	2nd Wall Thickness G2
3 x 2 1/2	5.500	7.500	7.000	0.750	0.690	0.380	0.310
3 x 2	5.500	7.500	6.000	0.750	0.620	0.380	0.310
4 x 3	6.500	9.000	7.500	0.940	0.750	0.500	0.380
4 x 2 1/2	6.500	9.000	7.000	0.940	0.690	0.500	0.310
4 x 2	6.500	9.000	6.000	0.940	0.620	0.500	0.310
6 x 5	8.000	11.000	10.000	1.000	0.940	0.560	0.500
6 x 4	8.000	11.000	9.000	1.000	0.940	0.560	0.500
6 x 3	8.000	11.000	7.500	1.000	0.750	0.560	0.380
8 x 6	9.000	13.500	11.000	1.120	1.000	0.620	0.560
8 x 5	9.000	13.500	10.000	1.120	0.940	0.620	0.500
8 x 4	9.000	13.500	9.000	1.120	0.940	0.620	0.500
10 x 8	11.000	16.000	13.500	1.190	1.120	0.750	0.620
10 x 6	11.000	16.000	11.000	1.190	1.000	0.750	0.560
12 x 10	12.000	19.000	16.000	1.250	1.190	0.810	0.750
12 x 8	12.000	19.000	13.500	1.250	1.120	0.810	0.620

CAST IRON LONG RADIUS FLANGED 90° ELLS *



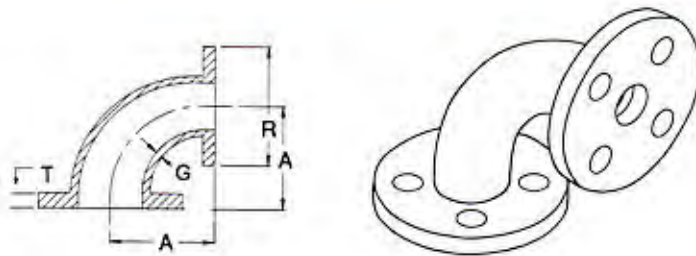
NPS	Center to Face A	Flange Diameter R	Bolt Circle	Flange Thickness T	Wall Thickness G	No. of Bolts
2"	6.500	6.000	4 3/4"	0.620	0.310	4
2 1/2"	7.000	7.000	5 1/2"	0.690	0.310	4
3"	7.750	7.500	6"	0.750	0.380	4
4"	9.000	9.000	7 1/2"	0.940	0.500	8
6"	11.500	11.000	9 1/2"	1.000	0.560	8
8"	14.000	13.500	11 3/4"	1.120	0.620	8
10"	16.500	16.000	14 1/4"	1.190	0.750	12
12"	19.000	19.000	17"	1.250	0.810	12

CAST IRON FLANGED REDUCING 90° ELLS *



NPS	Center to Face A	1st Flange Diameter R1	2nd Flange Diameter R2	1st Flange Thickness B1	2nd Flange Thickness B2	1st Wall Thickness G1	2nd Wall Thickness G2
3 x 2 1/2	5.500	7.500	7.000	0.750	0.690	0.380	0.310
3 x 2	5.500	7.500	6.000	0.750	0.620	0.380	0.310
4 x 3	6.500	9.000	7.500	0.940	0.750	0.500	0.380
4 x 2 1/2	6.500	9.000	7.000	0.940	0.690	0.500	0.310
4 x 2	6.500	9.000	6.000	0.940	0.620	0.500	0.310
6 x 5	8.000	11.000	10.000	1.000	0.940	0.560	0.500
6 x 4	8.000	11.000	9.000	1.000	0.940	0.560	0.500
6 x 3	8.000	11.000	7.500	1.000	0.750	0.560	0.380
8 x 6	9.000	13.500	11.000	1.120	1.000	0.620	0.560
8 x 5	9.000	13.500	10.000	1.120	0.940	0.620	0.500
8 x 4	9.000	13.500	9.000	1.120	0.940	0.620	0.500
10 x 8	11.000	16.000	13.500	1.190	1.120	0.750	0.620
10 x 6	11.000	16.000	11.000	1.190	1.000	0.750	0.560
12 x 10	12.000	19.000	16.000	1.250	1.190	0.810	0.750
12 x 8	12.000	19.000	13.500	1.250	1.120	0.810	0.620

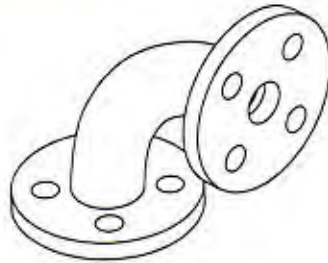
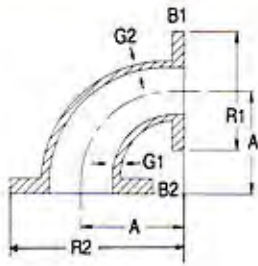
CAST IRON LONG RADIUS FLANGED 90° ELLS *



NPS	Center to Face A	Flange Diameter R	Bolt Circle	Flange Thickness T	Wall Thickness G	No. of Bolts
2"	6.500	6.000	4 3/4"	0.620	0.310	4
2 1/2"	7.000	7.000	5 1/2"	0.690	0.310	4
3"	7.750	7.500	6"	0.750	0.380	4
4"	9.000	9.000	7 1/2"	0.940	0.500	8
6"	11.500	11.000	9 1/2"	1.000	0.560	8
8"	14.000	13.500	11 3/4"	1.120	0.620	8
10"	16.500	16.000	14 1/4"	1.190	0.750	12
12"	19.000	19.000	17"	1.250	0.810	12

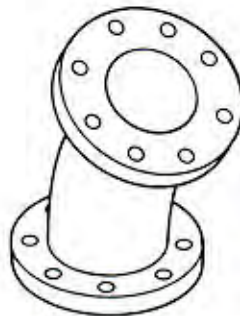
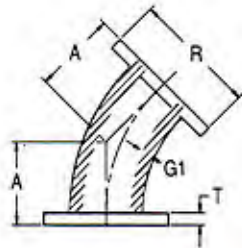
CAST IRON LONG RADIUS FLANGED *

REDUCING 90° ELLS



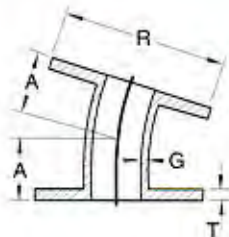
NPS	Center to Face A	1st Flange Diameter R1	2nd Flange Diameter R2	Wall Thickness G1 (min)	Wall Thickness G2(min)	Flange Thickness B1 (min)	Flange Thickness B2 (min)
4 x 3"	9.000	9.000	7.500	0.500	0.380	0.940	0.750
6 x 4"	11.500	11.000	9.000	0.560	0.500	1.000	0.940
8 x 6"	14.000	13.500	11.000	0.620	0.560	1.120	1.000

CAST IRON FLANGED 45° ELLS *



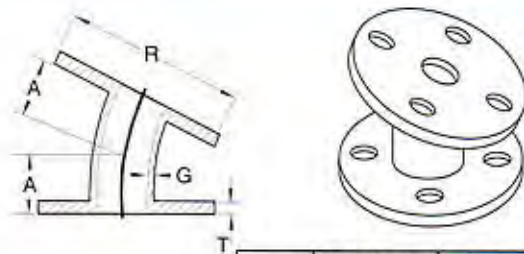
NPS	Center to Face A	Flange Diameter R	Bolt Circle	Flange Thickness T (min)	Wall Thickness G1	No. of Bolts
2"	2.500	6.000	4 3/4"	0.620	0.310	4
2 1/2"	3.000	7.000	5 1/2"	0.690	0.310	4
3"	3.000	7.500	6"	0.750	0.380	4
4"	4.000	9.000	7 1/2"	0.940	0.500	8
6"	5.000	11.000	9 1/2"	1.000	0.560	8
8"	5.500	13.500	11 3/4"	1.120	0.620	8
10"	6.500	16.000	14 1/4"	1.190	0.750	12
12"	7.500	19.000	17"	1.250	0.810	12

CAST IRON FLANGED 11 1/4° DEGREE ELBOW



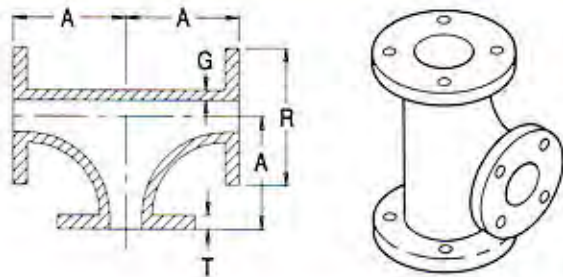
NPS	Center to Face A	Flange Diameter B	Bolt Circle	Flange Thickness T (min)	Wall Thickness	No. of Bolts	Bolt Diameter	Hole Diameter	Bolt Length
6"	5.000	11.000	9 1/2"	1.000	0.560	8	3/4"	7/8"	3 1/4"
8"	5.500	13.500	11 3/4"	1.120	0.620	8	3/4"	7/8"	3 1/2"
10"	6.500	16.000	14 1/4"	1.190	0.750	12	7/8"	1"	3 3/4"
12"	7.500	19.000	17"	1.250	0.810	12	7/8"	1"	3 3/4"

CAST IRON FLANGED 22 1/2° DEGREE ELBOW



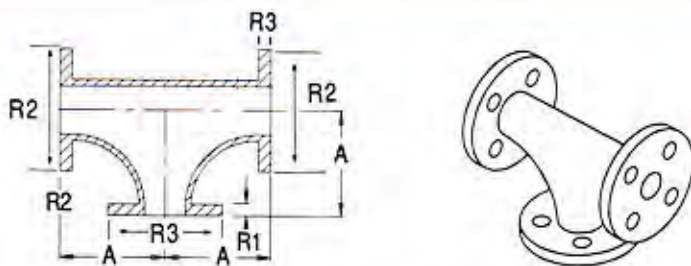
NPS	Center to Face A	Flange Diameter B	Bolt Circle	Flange Thickness T (min)	Wall Thickness	No. of Bolts	Bolt Diameter	Hole Diameter	Bolt Length
4"	4.000	9.000	7 1/2"	0.940	0.500	8	5/8"	3/4"	3"
6"	5.000	11.000	9 1/2"	1.000	0.560	8	3/4"	7/8"	3 1/4"
8"	5.500	13.500	11 3/4"	1.120	0.620	8	3/4"	7/8"	3 1/2"
10"	6.500	16.000	14 1/4"	1.190	0.750	12	7/8"	1"	3 3/4"
12"	7.500	19.000	17"	1.250	0.810	12	7/8"	1"	3 3/4"

CAST IRON FLANGED STRAIGHT TEES *



NPS	Center to Face A	Flange Diameter R	Bolt Circle	Flange Thickness T (min)	Wall Thickness G	No. of Bolts
2"	4.500	6.000	4 3/4"	0.620	0.310	4
2 1/2"	5.000	7.000	5 1/2"	0.690	0.310	4
3"	5.500	7.500	6"	0.750	0.380	4
4"	6.500	9.000	7 1/2"	0.940	0.500	8
5"	7.500	10.000	8 1/2"	0.940	0.500	8
6"	8.000	11.000	9 1/2"	1.000	0.560	8
8"	9.000	13.500	11 3/4"	1.120	0.620	8
10"	11.000	16.000	14 1/4"	1.190	0.750	12
12"	12.000	19.000	17"	1.250	0.810	12

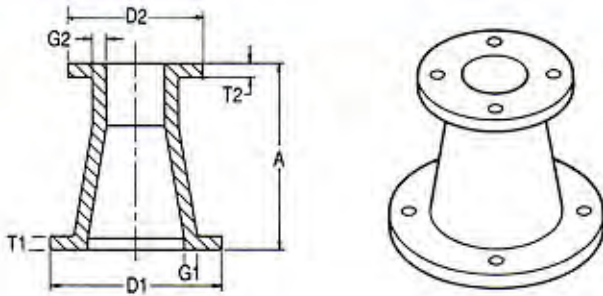
CAST IRON FLANGED REDUCING TEES *



NPS	Center to Face A	First Flange R1	Second Flange R2	Third Flange R3
3 x 3 x 2 1/2"	5.500	7.500	7.500	7.000
3 x 3 x 2"	5.500	7.500	7.500	6.000
4 x 3 x 4"	6.500	9.000	7.500	9.000
4 x 4 x 6"	8.000	9.000	9.000	11.000
4 x 4 x 3"	6.500	9.000	9.000	7.000
4 x 4 x 2 1/2"	6.500	9.000	9.000	7.000
4 x 4 x 2"	6.500	9.000	9.000	6.000
6 x 4 x 6"	8.000	11.000	9.000	11.000

6 x 4 x 4"	8.000	11.000	9.000	9.000
6 x 6 x 8"	9.000	11.000	11.000	13.500
6 x 6 x 4"	8.000	11.000	11.000	9.000
6 x 6 x 3"	8.000	11.000	11.000	7.500
6 x 6 x 2 1/2"	8.000	11.000	11.000	7.000
6 x 6 x 2"	8.000	11.000	11.000	6.000
8 x 6 x 8"	9.000	13.500	11.000	13.500
8 x 6 x 6"	9.000	13.500	11.000	11.000
8 x 6 x 4"	9.000	13.500	11.000	9.000
8 x 8 x 10"	11.000	13.500	13.500	16.000
8 x 8 x 6"	9.000	13.500	13.500	11.000
8 x 8 x 4"	9.000	13.500	13.500	9.000
10 x 10 x 8"	11.000	16.000	16.000	13.500
10 x 10 x 12"	12.000	16.000	16.000	19.000
10 x 10 x 8"	11.000	16.000	16.000	13.500
10 x 10 x 6"	11.000	16.000	16.000	11.000
10 x 10 x 4"	11.000	16.000	16.000	9.000
12 x 12 x 10"	12.000	19.000	19.000	16.000
12 x 12 x 8"	12.000	19.000	19.000	13.500
12 x 12 x 6"	12.000	19.000	19.000	11.000
12 x 12 x 4"	12.000	19.000	19.000	9.000

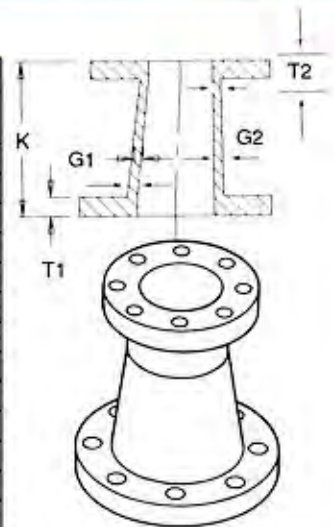
CAST IRON FLANGED CONCENTRIC REDUCERS *



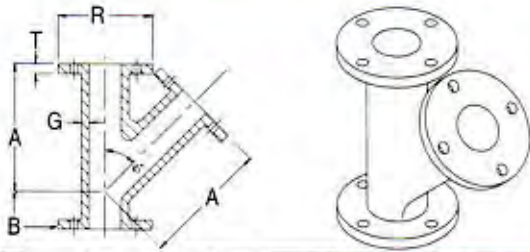
NPS	End to End Overall A	Flange Diameter D1	Flange Diameter D2	1st Flg. Thickness T1 (min)	2nd Flg. Thickness T2 (min)	1st Wall Thickness G1 (min)	2nd Wall Thickness G2 (min)
2 1/2 x 2"	5.500	7.000	6.000	0.690	0.620	0.310	0.310
3 x 2 1/2"	6.000	7.500	7.000	0.750	0.690	0.380	0.310
3 x 2"	6.000	7.500	6.000	0.750	0.620	0.380	0.310
4 x 3"	7.000	9.000	7.500	0.940	0.750	0.500	0.380
4 x 2 1/2"	7.000	9.000	7.000	0.940	0.690	0.500	0.310
4 x 2"	7.000	9.000	6.000	0.940	0.620	0.500	0.310
5 x 4"	8.000	10.000	9.000	0.940	0.940	0.500	0.500
6 x 5"	9.000	11.000	10.000	1.000	0.940	0.560	0.500
6 x 4"	9.000	11.000	9.000	1.000	0.940	0.560	0.500
6 x 3"	9.000	11.000	7.500	1.000	0.750	0.560	0.380
6 x 2 1/2"	9.000	11.000	7.000	1.000	0.690	0.560	0.310
6 x 2"	9.000	11.000	6.000	1.000	0.620	0.560	0.310
8 x 6"	11.000	13.500	11.000	1.120	1.000	0.620	0.560
8 x 5"	11.000	13.500	10.000	1.120	0.940	0.620	0.500
8 x 4"	11.000	13.500	9.000	1.120	0.940	0.620	0.500
10 x 8"	12.000	16.000	13.500	1.190	1.120	0.750	0.620
10 x 6"	12.000	16.000	11.000	1.190	1.000	0.750	0.560
12 x 10"	12.000	19.000	16.000	1.250	1.190	0.810	0.750
12 x 8"	12.000	19.000	13.500	1.250	1.120	0.810	0.620
12 x 6"	12.000	19.000	11.000	1.250	1.000	0.810	0.560

CAST IRON FLANGED ECCENTRIC REDUCERS *

NPS	Length K	Flange Diameter R1	Flange Diameter R2	Wall Thickness G1 Min	Wall Thickness G2 Min	Flange Thickness T1 Min	Flange Thickness T2 Min	Offset O
3 x 2"	6.000	7.500	6.000	0.380	0.310	0.750	0.620	0.750
4 x 3"	7.000	9.000	7.500	0.500	0.380	0.940	0.750	0.750
4 x 2"	7.000	9.000	6.000	0.500	0.310	0.940	0.620	1.500
6 x 5"	9.000	11.000	10.000	0.560	0.500	1.000	0.940	0.500
6 x 4"	9.000	11.000	9.000	0.560	0.500	1.000	0.940	1.000
6 x 3"	9.000	11.000	7.500	0.560	0.380	1.000	0.750	1.750
8 x 6"	11.000	13.500	11.000	0.620	0.560	1.120	1.000	1.250
8 x 5"	11.000	13.500	10.000	0.620	0.500	1.120	0.940	1.750
8 x 4"	11.000	13.500	9.000	0.620	0.500	1.120	0.940	2.250
10 x 8"	12.000	16.000	13.500	0.750	0.620	1.190	1.120	1.250
10 x 6"	12.000	16.000	11.000	0.750	0.560	1.190	1.000	2.500
12 x 10"	14.000	19.000	16.000	0.810	0.750	1.250	1.190	1.500
12 x 8"	14.000	19.000	13.500	0.810	0.620	1.250	1.120	2.750

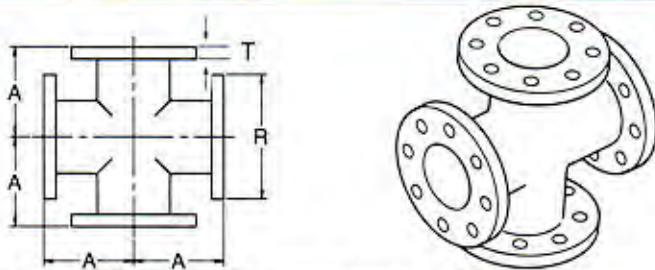


CAST IRON FLANGED 45° LATERALS *



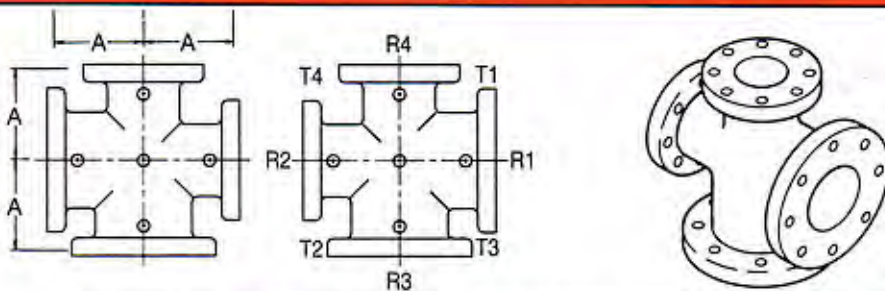
NPS	Center to Face A	Center to Face B1	Flange Dia. R	Bolt Circle	Flange Thickness T (min)	Wall Thickness G (min)	Number of Bolts	Bolt Dia.	Hole Dia.	Length of Bolt
2 1/2"	9.500	2.500	7.000	5 1/2"	0.690	0.310	4	5/8"	3/4"	2 1/2"
3"	10.000	3.000	7.500	6"	0.750	0.380	4	5/8"	3/4"	2 1/2"
4"	12.000	3.000	9.000	7 1/2"	0.940	0.500	8	5/8"	3/4"	3"
6"	14.500	3.500	11.000	9 1/2"	1.000	0.560	8	3/4"	7/8"	3 1/4"
8"	17.500	4.500	13.500	11 3/4"	1.120	0.620	8	3/4"	7/8"	3 1/2"
10"	11.000	5.000	16.000	14 1/4"	1.190	0.750	12	7/8"	1"	3 3/4"
12"	12.000	5.500	19.000	17"	1.250	0.810	12	7/8"	1"	3 3/4"

CAST IRON FLANGED CROSSES *



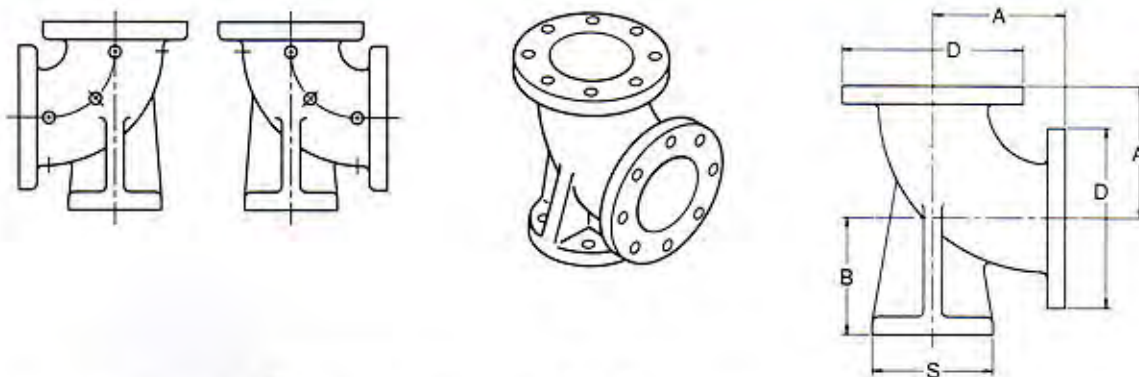
NPS	Center to Face A	Flange Diameter R	Bolt Circle	Flange Thickness T (min)	Wall Thickness	No. of Bolts	Bolt Dia.	Hole Dia.	Bolt Length
2 1/2"	5.000	7.000	5 1/2"	0.690	0.310	4	5/8"	3/4"	2 1/2"
3"	5.500	7.500	6"	0.750	0.380	4	5/8"	3/4"	2 1/2"
4"	6.500	9.000	7 1/2"	0.940	0.500	8	5/8"	3/4"	3"
6"	8.000	11.000	9 1/2"	1.000	0.560	8	3/4"	7/8"	3 1/4"
8"	9.000	13.500	11 3/4"	1.120	0.620	8	3/4"	7/8"	3 1/2"
10"	11.000	16.000	14 1/4"	1.190	0.750	12	7/8"	1"	3 3/4"
12"	12.000	19.000	17"	1.250	0.810	12	7/8"	1"	3 3/4"

CAST IRON FLANGED REDUCING CROSSES *



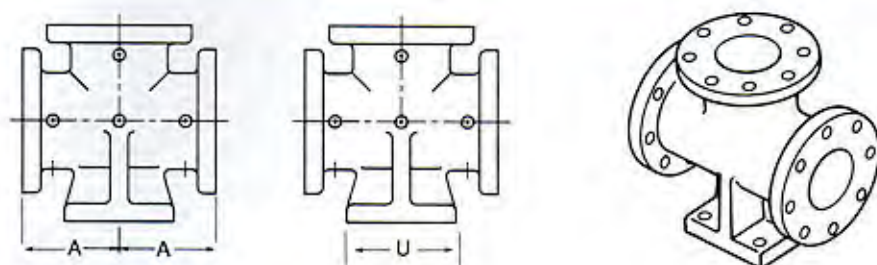
NPS	Center to Face A	Flange Dia. R1	Flange Dia. R2	Flange Dia. R3	Flange Dia. R4	Flange Thickness T1 (min)	Flange Thickness T2 (min)	Flange Thickness T3 (min)	Flange Thickness T4 (min)	Wall Thickness 1	Wall Thickness 2	Wall Thickness 3	Wall Thickness 4
6 x 4"	8.000	11.000	11.000	9.000	9.000	1.000	1.000	0.940	0.940	0.560	0.560	0.500	0.500
8 x 6"	9.000	13.500	13.500	11.000	11.000	1.120	1.120	1.000	1.000	0.620	0.620	0.560	0.560

STRAIGHT STANDARD FLANGED BASE 90° ELBOWS *



Size	Dimensions			Base Drilling	
	Center to Face A	Height of Base B	Outside Dia. D(min)	Round & Square S Base U	Bolt Circle or Bolt Spacing W(min)
3	5.500	4.875	7.500	5.000	3.875
4	6.500	5.500	9.000	6.000	4.750
6	8.000	7.000	11.000	7.000	5.500
8	9.000	8.375	13.500	9.000	7.500
10	11.000	9.750	16.000	9.000	7.500
12	12.000	11.250	19.000	11.000	9.500

STRAIGHT STANDARD FLANGED BASE TEES *



Size	Dimensions			Base Drilling	
	Center to Face	Height of Base (min)	Outside Dia. (min)	Round & Square Base U	Bolt Circle or Bolt Spacing W(min)
3	5.500	4.875	7.500	5.000	3.875
4	6.500	5.500	9.000	6.000	4.750
5	7.500	6.250	10.000	7.000	5.500
6	8.000	7.000	11.000	7.000	5.500
8	9.000	8.375	13.500	9.000	7.500

* May not be produced in Blossburg

CAST IRON DRAINAGE FITTINGS

Pipe Size	Thread Length	Total Length of Thd Chamber to Shoulder	I.D. of Fittings	Wall Thickness	O.D. of Band
	B	C	F	G	H
1 1/4"	.420	.710	1.380	.180	2.390
1 1/2"	.420	.720	1.610	.200	2.680
2"	.440	.760	2.070	.220	3.280
2 1/2"	.680	1.140	2.470	.240	3.860
3"	.770	1.200	3.070	.260	4.620
4"	.840	1.300	4.030	.310	5.790

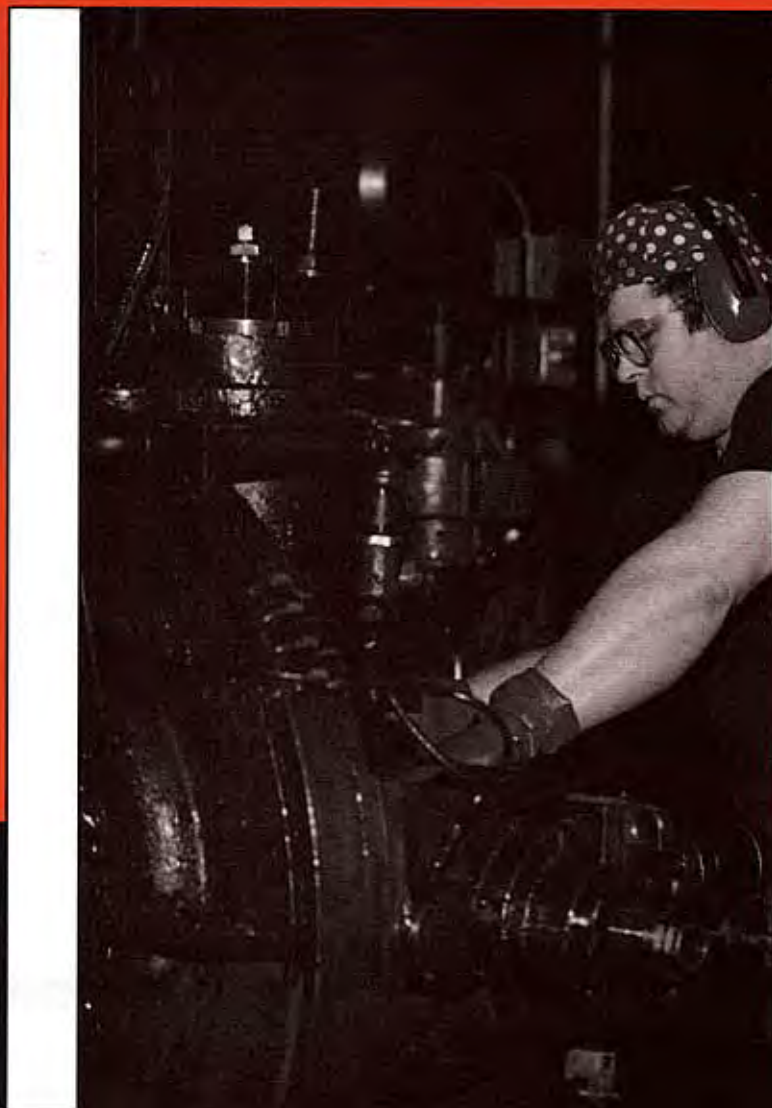
WARD cast iron drainage fittings, shown on the following pages, are designed especially for drainage systems using wrought pipe. The inside diameter of the fitting is the same as that of wrought pipe.

WARD drainage fittings are made with an interior shoulder so that when the joint is made the end of the pipe practically meets the shoulder thereby forming a continuous unobstructed surface providing smooth flow of the pipe contents.

WARD 90 degree ells, except for the street ells, are pitched 1/4" per foot. WARD drainage fittings meet existing requirements for the sanitary codes and are manufactured in strict accordance with ANSI.

IMPORTANT

Be sure to specify the type of finish desired. As with the rest of the WARD line of fittings, drainage can be supplied in black or galvanized.



Material: ASTM A126
Class A Minimum
for cast iron

Dimensions: ANSI/ASME B 16.12
ANSI B 1.20.1
for pipe threads

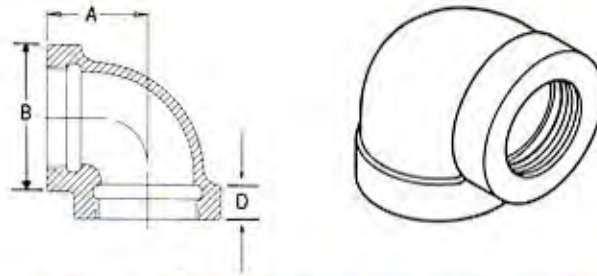
Galvanizing: ASTM(ANSI) A 153

Additional Specifications: UL, ULC and FM where applicable, Federal Specifications WWP 941

CAST IRON DRAINAGE 90° ELLS SHORT TURN

FIGURE 31

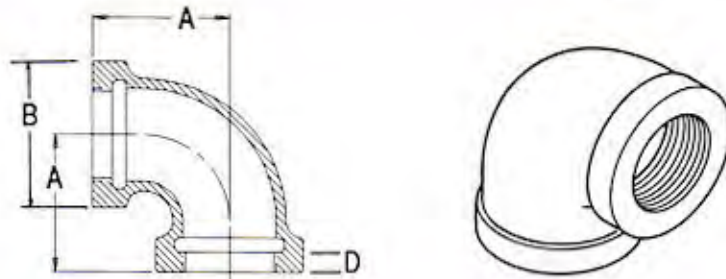
NPS	Center to End	Outside Dia.	Length of Thread
	A	B	D
1 1/4	1.750	2.390	.420
1 1/2	1.937	2.680	.420
2	2.250	3.280	.436
3	3.062	4.620	.766
4	3.812	5.790	.844
2 X 1 1/2	2.250	3.280	.436



CAST IRON DRAINAGE 90° ELLS LONG TURN

FIGURE 33

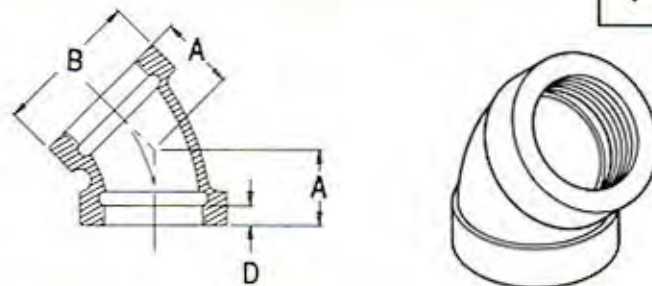
NPS	Center to End	Outside Dia.	Length of Thread
	A	B	D
1 1/2	2.500	2.680	.420
2	3.062	3.280	.436
3	4.250	4.620	.766



CAST IRON DRAINAGE 45° ELLS SHORT TURN

FIGURE 32

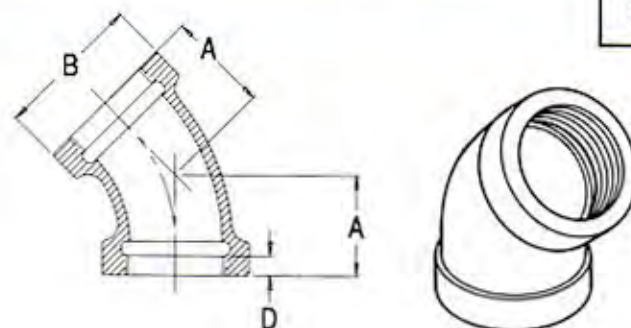
NPS	Center to End	Outside Dia.	Length of Thread
	A	B	D
1 1/4	1.312	2.390	.420
1 1/2	1.437	2.680	.420
2	1.687	3.280	.436
3	2.187	4.620	.766
4	2.625	5.790	.844



CAST IRON DRAINAGE 45° ELLS LONG TURN

FIGURE 34

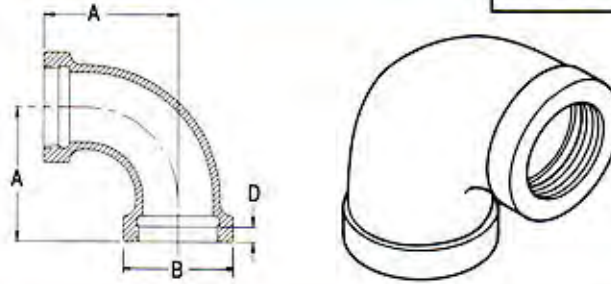
NPS	Center to End	Outside Dia.	Length of Thread
	A	B	D
1 1/2	1.875	2.680	.420
2	2.250	3.280	.436



CAST IRON 90° ELLS EXTRA LONG TURN

FIGURE 78

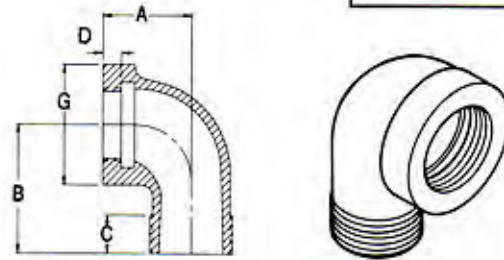
NPS	Center to End	Outside Dia.	Length of Thread
	A	B	D
1 1/2	3.500	2.680	.420
2	4.000	3.280	.436



CAST IRON DRAINAGE 90° STREET ELLS *

FIGURE 35

NPS	Center to End Female	Center to End Male	Length of Male Thread	Length of Thread	Outside Diameter
	A	B	C	D	G
1 1/2	1.980	2.860	.850	.720	2.680
2	2.160	3.190	.870	.760	3.280

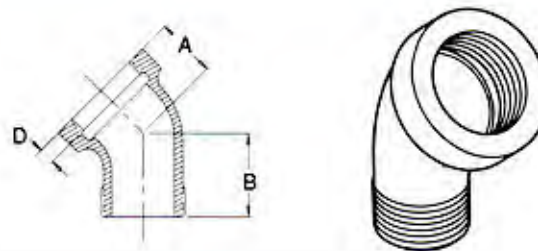


* Manufactured to WARD Specifications

CAST IRON DRAINAGE 45° STREET ELLS *

FIGURE 36

NPS	Center to End	Outside Dia.	Length of Thread
	A	B	D
1 1/2	1.500	1.875	.420
2	1.650	2.300	.436

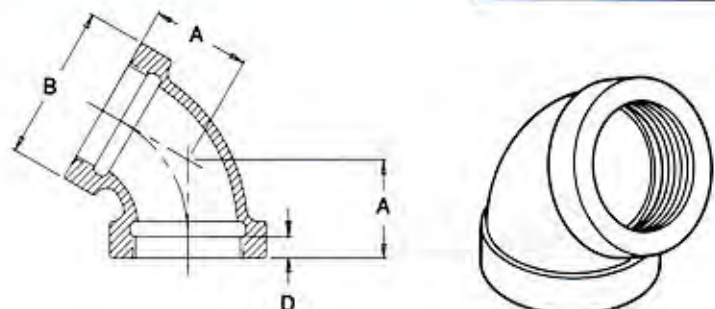


* Manufactured to WARD Specifications

CAST IRON DRAINAGE 60° ELLS SHORT TURN

FIGURE 37

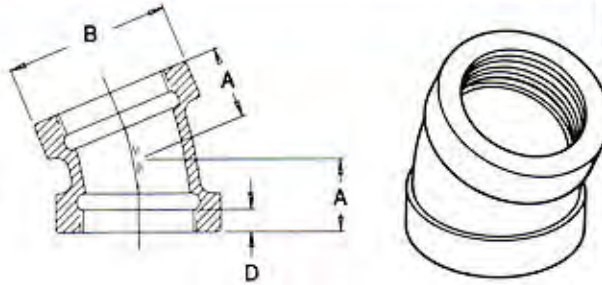
NPS	Center to End	Center to End Male	Length of Thread
	A	B	D
1 1/2	1.750	2.680	.420
2	2.062	3.280	.436



CAST IRON DRAINAGE 22 1/2° ELLS SHORT TURN

FIGURE 74

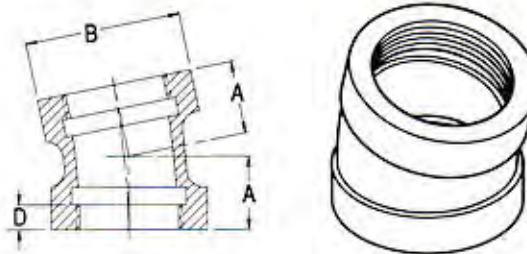
NPS	Center to End	Outside Dia.	Length of Thread
	A	B	D
1 1/2	1.250	2.680	.420
2	1.437	3.280	.436



CAST IRON DRAINAGE 11 1/4° ELLS SHORT TURN

FIGURE 75

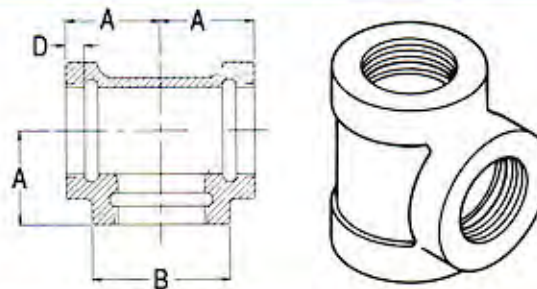
NPS	Center to End	Outside Dia.	Length of Thread
	A	B	D
1 1/2	1.250	2.680	.420
2	1.375	3.280	.436



CAST IRON DRAINAGE TEE

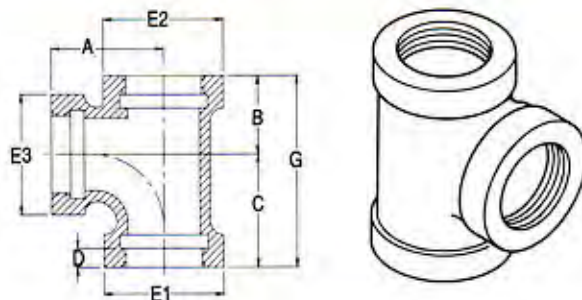
FIGURE 38

NPS	Center to End	Outside Dia.	Length of Thread
	A	B	D
1 1/2	1.937	2.680	.420
2	2.250	3.280	.436
2 X 1 1/2	2.250	3.280	.436

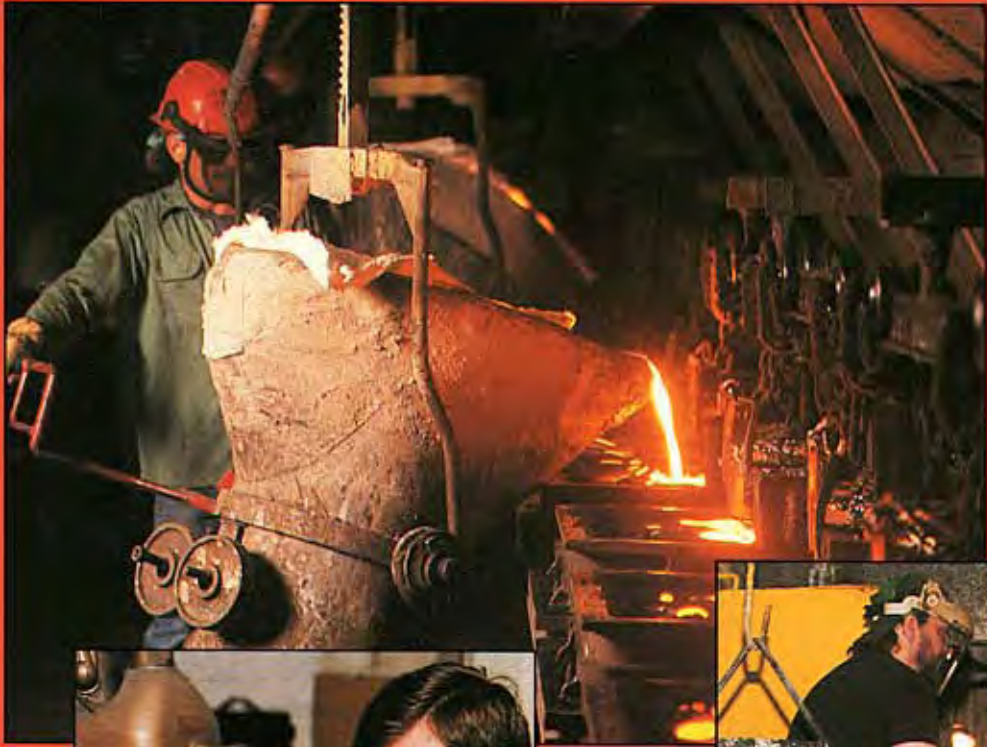


CAST IRON DRAINAGE "TY" SHORT TURN

FIGURE 39

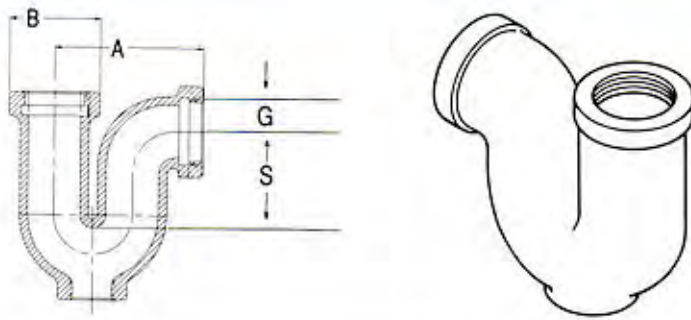


NPS	Center to End	Center to End	Center to End	Overall Length	Outside Dia.	Outside Dia.	Outside Dia.	Length of Thread
	A	B	C	G	E1	E2	E3	D
1 1/2	2.500	1.750	2.500	4.250	2.680	2.680	2.680	.420
2	3.062	2.125	3.062	5.187	3.280	3.280	3.280	.436
4	5.187	3.562	5.187	8.750	5.790	5.790	5.790	.844
2 X 1 1/2	2.937	1.937	2.687	4.625	3.280	3.280	2.680	.436
2 X 1 1/2 X 1 1/2	2.560	1.937	2.625	4.560	3.170	2.680	2.680	.436
2 X 1 1/2 X 2	3.062	2.125	3.125	5.250	3.280	2.680	3.280	.436



CAST IRON DRAINAGE P TRAP WITH CLEANOUT

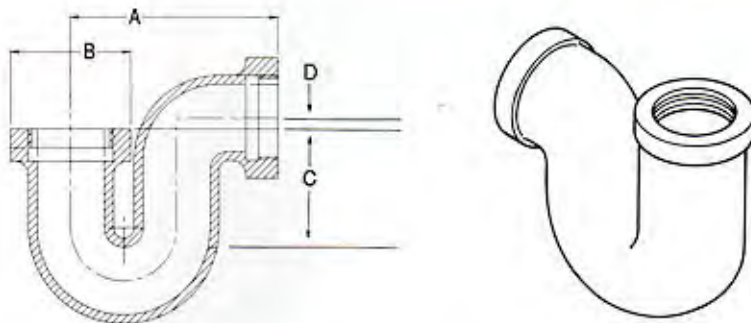
FIGURE 45



NPS	Center to End	Outside Dia.	Center to End	Water Seal
	A	B	G	S (min)
1 1/2	4.375	2.680	.880	2.000
2	5.312	3.280	.880	2.000

CAST IRON DRAINAGE P TRAP WITHOUT CLEANOUT *

FIGURE 46



NPS	Center to End	Outside Dia.	Center to End	Center to End
	A	B	C	D
1 1/2	4.375	2.680	2.000	.250
2	5.312	3.280	2.000	0.000

* Manufactured to WARD Specifications

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