

DOMESTIC

NON-DOMESTIC

## SUBMITTAL: C110 FLANGE JOINT CLASS 125 PRODUCT

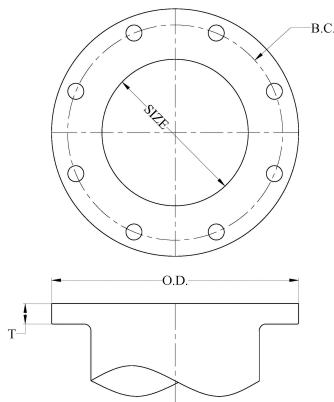
(Current revisions for the noted Standards apply)

- SIZES:** 2" - 64" (Contact Tyler Union for 54" - 64" flange fitting information)
- STANDARDS:** ANSI/AWWA C110/A21.10, NFPA 13/24, ASME B16.1, 3" - 12" UL listed and FM approved
- MATERIAL:** Cast of ASTM A536 qualified ductile iron. Date code is cast on and required for traceability.
- PRESSURE RATING:** \*Flanged fittings \*2" - 48" rated at 250 psi. 54" - 64" rated at 150psi.  
\*Note: With rubber annular ring flange gasket, 2" - 24" flanged fittings can be rated at 350 psi.
- DEFLECTION:** Deflection is "not" recommended for flange joint due to the rigidity of the joint.
- NSF-61 & NSF372:** Meets all requirements including Annex G, Tyler Union's Underwriters Laboratory listing MH16439.
- COATING:** Asphaltic or Primer per ANSI/AWWA C104/A21.4, Standard primer is Tnemec Pota Pox N140-1211. Contact Tyler Union for additional coating options.
- CEMENT LINING:** Per ANSI/AWWA C104/A21.4, with double cement lining available upon request.
- EPOXY COATING:** Fusion bonded epoxy per ANSI/AWWA C116/A21.16. Additional coatings available upon request.
- BARE FITTINGS:** Available upon request.
- FLANGES:** ANSI Class 125 per ASME B16.1 and ANSI/AWWA C111/A21.11. Bolt holes shall straddle the center line
- NOTE: Class 125 ASME B16.1 are not compatible with Class 250 Flanges**
- NOTE: Class 250 ASME B16.1 fittings are available upon request.**
- FASTNERS:** High strength low alloy weathering steel per ANSI/AWWA C111/A21.11 and ASTM A242
- INSTALLATION:** Install per AWWA C600/C651 using pipe conforming to ANSI/AWWA C151/A21.51.

FLANGE DETAILS IN INCHES

BOLTS

Size Inches	Diameter DI Pipe	Flange O.D.	B.C. Diameter	Flange Thickness T	Bolt Hole Diameter	Size	Qty
2	2.51	6.00	4.75	0.62	0.750	5/8 x 2-1/4	4
3	3.96	7.50	6.00	0.75	0.750	5/8 x 2-1/4	4
4	4.80	9.00	7.50	0.94	0.750	5/8 x 3	8
6	6.90	11.00	9.50	1.00	0.875	3/4 x 3-1/2	8
8	9.05	13.50	11.75	1.12	0.875	3/4 x 3-1/2	8
10	11.10	16.00	14.25	1.19	1.000	7/8 x 4	12
12	13.20	19.00	17.00	1.25	1.000	7/8 x 4	12
14	15.30	21.00	18.75	1.38	1.125	1 x 4-1/2	12
16	17.40	23.50	21.25	1.44	1.125	1 x 4-1/2	16
18	19.50	25.00	22.75	1.56	1.250	1-1/8 x 5	16
20	21.60	27.50	25.00	1.69	1.250	1-1/8 x 5	20
24	25.80	32.00	29.50	1.88	1.375	1-1/4 x 5-1/2	20
30	32.00	38.75	36.00	2.12	1.375	1-1/4 x 5-1/2	28
36	38.30	46.00	42.75	2.38	1.625	1-1/2 x 7	32
42	44.50	53.00	49.50	2.62	1.625	1-1/2 x 7-1/2	36
48	50.80	59.50	56.00	2.75	1.625	1-1/2 x 8	44
54	Available on Request						
60	Available on Request						
64	Available on Request						



## PROTECTO 401™ Ceramic Epoxy

### STANDARD SPECIFICATION FOR LINING DUCTILE IRON PIPE FOR SEWER SERVICE

#### I. CONDITION OF DUCTILE IRON PRIOR TO SURFACE PREPARATION

All ductile pipe and fittings shall be delivered to the application facility without asphalt, cement lining, or any other lining on the interior surface. Because removal of old linings may not be possible, the intent of this specification is that the entire interior of the ductile iron pipe and fittings shall not have been lined with any substance prior to the application of the specified lining material and no coating shall have been applied to the first six inches of the exterior of the spigot ends.

#### II. LINING MATERIAL

The Standard of Quality is Protecto 401 Ceramic Epoxy. The material shall be an amine cured novalac epoxy containing at least 20% by volume of ceramic quartz pigment. Any request for substitution must be accompanied by a successful history of lining pipe and fittings for sewer service, a test report verifying the following properties, and a certification of the test results.

A. A permeability rating of 0.00 when tested according to Method A of ASTM E-96-66, Procedure A with a test duration of 30 days.

B. The following test must be run on coupons from factory lined ductile iron pipe:

- \* ASTM B-117 Salt Spray (scribed panel) - Results to equal 0.0 undercutting after two years.
- \* ASTM G-95 Cathodic Disbondment 1.5 volts @ 77°F. Results to equal no more than 0.5 mm undercutting after 30 days.
- \* Immersion testing rated using ASTM D-714-87.
  - 20% Sulfuric acid—No effect after two years.
  - 140°F 25% Sodium Hydroxide—No effect after two years.
  - 160°F Distilled Water—No effect after two years.
  - 120°F Tap Water (scribed panel)—0.0 undercutting after two years with no effect.
- \* ASTM G-22 90 Standard practice for determining resistance of Synthetic Polymeric materials to bacteria. The test should determine the resistance to growth of Acidithiobacillus Bacteria and should be conducted at 30 degrees centigrade for a period of 7 days on a minimum of 4 panels. The growth must be limited only to trace amounts of bacteria.

C. An abrasion resistance of no more than 3 mils (.075 mm) loss after one million cycles using European Standard EN 598: 1994 Section 7.8 Abrasion Resistance.

#### III. APPLICATION

##### Applicator

The lining shall be applied by a certified firm with a successful history of applying linings to the interior of ductile iron pipe and fittings.

##### Surface Preparation

Prior to abrasive blasting, the entire area to receive the protective compound shall be inspected for oil, grease, etc. Any areas with oil, grease, or any substance that can be removed by solvent, shall be solvent cleaned to remove those substances. After the surface has been made free of grease, oil or

other substances, all areas to receive the protective compounds shall be abrasive blasted using sand or grit abrasive media. The entire surface to be lined shall be struck with the blast media so that all rust, loose oxides, etc., are removed from the surface. Only slight stains and tightly adhering oxide may be left on the surface. Any area where rust reappears before lining must be reblasted.

## Lining

After surface preparation and within 12 hours of surface preparation, the interior of the pipe shall receive 40 mils nominal dry film thickness of Protecto 401. No lining shall take place when the substrate or ambient temperature is below 40°F. The surface also must be dry and dust free. If flange pipe or fittings are included in the project, the lining shall not be used on the face of the flange.

## Coating of Bell Sockets and Spigot Ends

Due to the tolerances involved, the gasket area and spigot end up to 6 inches back from the end of the spigot end must be coated with 6 mils nominal, 10 mils maximum using Protecto 401 Joint Compound. The Joint Compound shall be applied by brush to ensure coverage. Care should be taken that the Joint Compound is smooth without excess buildup in the gasket seat or on the spigot ends. Coating of the gasket seat and spigot ends shall be done after the application of the lining.

## Number of Coats

The number of coats of lining material applied shall be as recommended by the lining manufacturer. However, in no case shall this material be applied above the dry thickness per coat recommended by the lining manufacturer in printed literature. The maximum or minimum time between coats shall be that time recommended by the lining material manufacturer. To prevent delamination between coats, no material shall be used for lining which is not indefinitely recoatable with itself without roughening of the surface.

## Touch-Up and Repair

Protecto 401 Joint Compound shall be used for touch-up or repair in accordance with manufacturer's recommendations.

## IV. INSPECTION AND CERTIFICATION

### Inspection

All ductile iron pipe and fitting linings shall be checked for thickness using a magnetic film thickness gauge. The thickness testing shall be done using the method outlined in SSPC PA-2 Film Thickness Rating.

The interior lining of all pipe barrels and fittings shall be tested for pinholes with a non-destructive 2,500 volt test. Any defects found shall be repaired prior to shipment.

Each pipe joint and fitting shall be marked with the date of application of the lining system along with its numerical sequence of application on that date and records maintained by the applicator of his work.

### Certification

The pipe or fitting manufacturer must supply a certificate attesting to the fact that the applicator met the requirements of this specification, and that the material used was as specified.



Look Beneath the Surface.

## V. HANDLING

Protecto 401 lined pipe and fittings must be handled only from the outside of the pipe and fittings. No forks, chains, straps, hooks, etc. shall be placed inside the pipe and fittings for lifting, positioning, or laying. The pipe shall not be dropped or unloaded by rolling.

Care should be taken not to let the pipe strike sharp objects while swinging or being off loaded. Ductile iron pipe should never be placed on grade by use of hydraulic pressure from an excavator bucket or by banging with heavy hammers.

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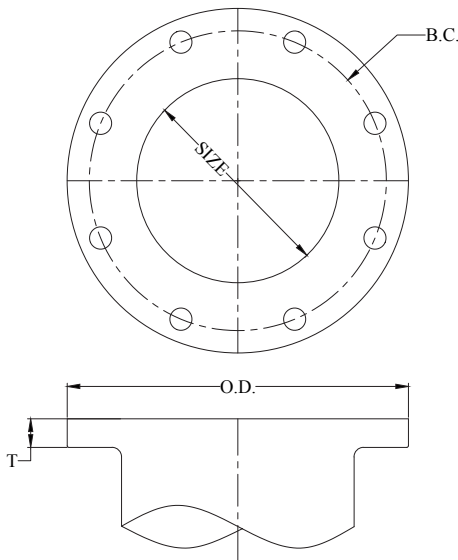
**C110 DUCTILE IRON FULL BODY FITTINGS**

**SAMPLE SPECIFICATIONS**

(Current ANSI/AWWA revisions apply)

Flanged fittings, 2” through 64”, shall be manufactured of Ductile Iron in accordance with all applicable terms and provisions of standards ANSI/AWWA C110/A21.10. Flange surfaces shall be faced and drilled in accordance with ANSI Class 125, B16.1. All Ductile Iron flanged fittings shall be rated for water pressure of 250 psi. Flanged ductile iron fittings in 24” (610 mm) and smaller sizes may be rated for 350 psi (2,413 kPa) with the use of special gaskets .

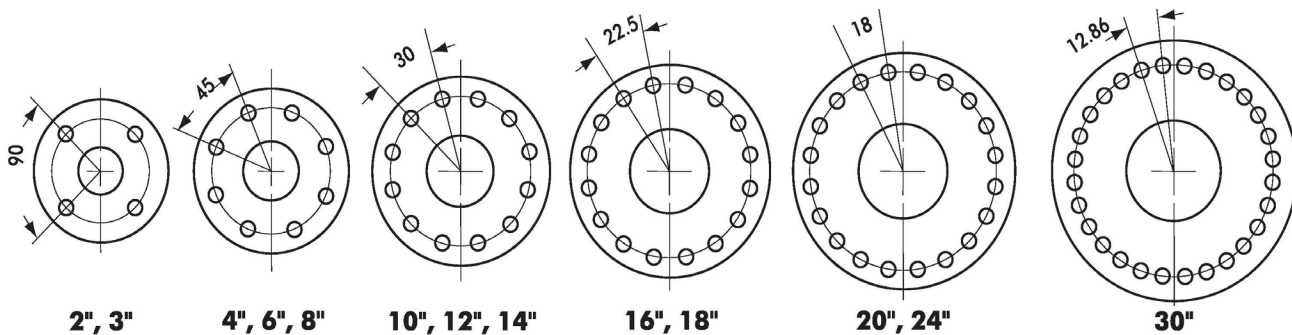
**NOTE:** Fittings are available prime coated, bare or epoxy coated. All coated fittings meet requirements of NSF-61, NSF-372 and Annex G. Interiors of fittings shall be lined and seal coated in accordance with ANSI/AWWA C104/A21.4. Installation of fittings shall be per AWWA C110.



ANSI/AWWA C110 Class 125 Flange Fittings

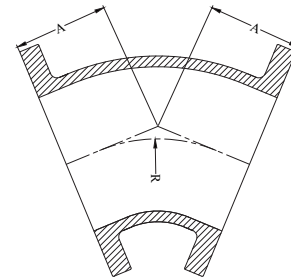
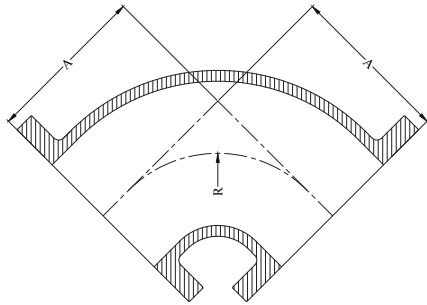
FLANGE DETAILS						
Nominal Pipe Size Inch	Flange O.D.	B.C. Diameter	Flange Thickness T	Bolt Hole Diameter	Number of Bolts	Bolt Dia. and Lengths
2	6.00	4.75	0.62	0.750	4	5/8 x 2 1/4
3	7.50	6.00	0.75	0.750	4	5/8 x 2 1/2
4	9.00	7.50	0.94	0.750	8	5/8 x 3
6	11.00	9.50	1.00	0.880	8	3/4 x 3 1/2
8	13.50	11.75	1.12	0.880	8	3/4 x 3 1/2
10	16.00	14.25	1.19	1.000	12	7/8 x 4
12	19.00	17.00	1.25	1.000	12	7/8 x 4
14	21.00	18.75	1.38	1.130	12	1 x 4 1/2
16	23.50	21.25	1.44	1.130	16	1 x 4 1/2
18	25.00	22.75	1.56	1.250	16	1 1/8 x 5
20	27.50	25.00	1.69	1.250	20	1 1/8 x 5
24	32.00	29.50	1.88	1.375	20	1 1/4 x 5 1/2
30	38.75	36.00	2.12	1.375	28	1 1/4 x 6 1/2
36	46.00	42.75	2.38	1.625	32	1 1/2 x 7
42	53.00	49.50	2.62	1.625	36	1 1/2 x 7 1/2
48	59.50	56.00	2.75	1.625	44	1 1/2 x 8
54	66.25	62.75	3.00	2.00	44	1 3/4 x 8 1/2
60	73.00	69.25	3.12	2.00	52	1 3/4 x 9
64	80.00	76.00	3.38	2.00	52	1 3/4 x 9

Contact Tyler Union for 54”–64” flange fitting information.



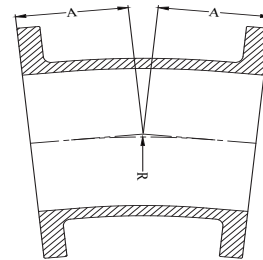
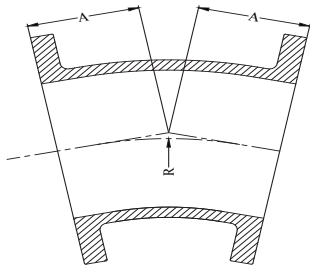
NOTE: Drilling templates are in multiples of four so that fittings may be made to face in any quarter. Bolt holes shall straddle the center line.

C110 DUCTILE IRON FULL BODY FITTINGS



90° (1/4) BENDS				
Size	R	A	Domestic	Import
			Weight	Weight
2	3.00	4.50	14	—
3	4.00	5.50	26	25
4	4.50	6.50	44	45
6	6.00	8.00	67	65
8	7.00	9.00	115	105
10	9.00	11.00	159	165
12	10.00	12.00	244	235
14	11.50	14.00	341	290
16	12.50	15.00	455	370
18	14.00	16.50	527	450
20	15.50	18.00	878	580
24	18.50	22.00	1085	900
30	21.50	25.00	1427	1430
36	24.50	28.00	2135	2135
42	27.50	31.00	3055	3055
48	30.50	34.00	4095	4095

45° (1/8) BENDS				
Size	R	A	Domestic	Import
			Weight	Weight
2	—	—	—	—
3	3.62	3.00	20	20
4	4.81	4.00	36	40
6	7.25	5.00	57	55
8	8.44	5.50	105	90
10	10.88	6.50	127	130
12	13.25	7.50	149	195
14	12.06	7.50	260	220
16	13.25	8.00	322	280
18	14.50	8.50	371	325
20	16.88	9.50	485	430
24	18.12	11.00	742	630
30	27.75	15.00	1355	1120
36	35.00	18.00	1755	1755
42	42.25	21.00	2600	2600
48	49.50	24.00	3580	3580



22½° (1/16) BENDS				
Size	R	A	Domestic	Import
			Weight	Weight
2	—	—	—	—
3	7.56	3.00	22	20
4	10.06	4.00	35	40
6	15.06	5.00	64	55
8	17.62	5.50	90	90
10	22.62	6.50	130	135
12	27.67	7.50	199	205
14	25.12	7.50	281	225
16	27.62	8.00	315	285
18	30.19	8.50	402	335
20	35.19	9.50	543	435
24	37.69	11.00	528	640
30	57.81	15.00	1385	1135
36	72.88	18.00	1790	1790
42	88.00	21.00	2665	2663
48	103.06	24.00	3665	3665

11¼° (1/32) BENDS				
Size	R	A	Domestic	Import
			Weight	Weight
2	—	—	—	—
3	15.25	3.00	20	20
4	20.31	4.00	40	40
6	30.50	5.00	56	55
8	35.50	5.50	90	90
10	45.69	6.50	136	135
12	55.81	7.50	213	205
14	50.75	7.50	261	225
16	55.81	8.00	315	285
18	60.94	8.50	385	335
20	71.06	9.50	505	435
24	76.12	11.00	760	645
30	116.75	15.00	1395	1150
36	147.25	18.00	1805	1805
42	177.69	21.00	2680	2680
48	208.12	24.00	3695	3695