

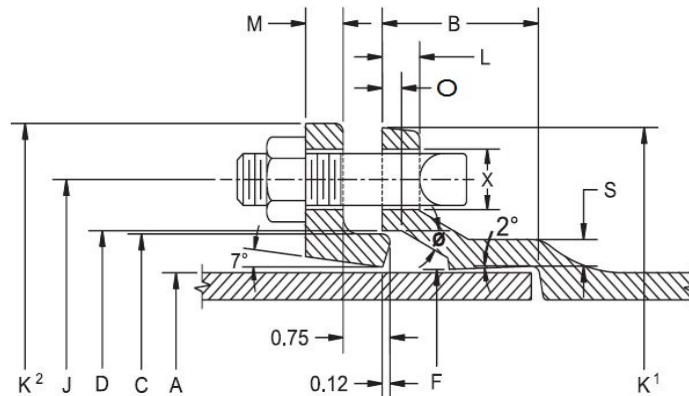
DOMESTIC

NON-DOMESTIC

SUBMITTAL: C110 MECHANICAL JOINT PRODUCT

[\(Current revisions for the noted Standards apply\)](#)

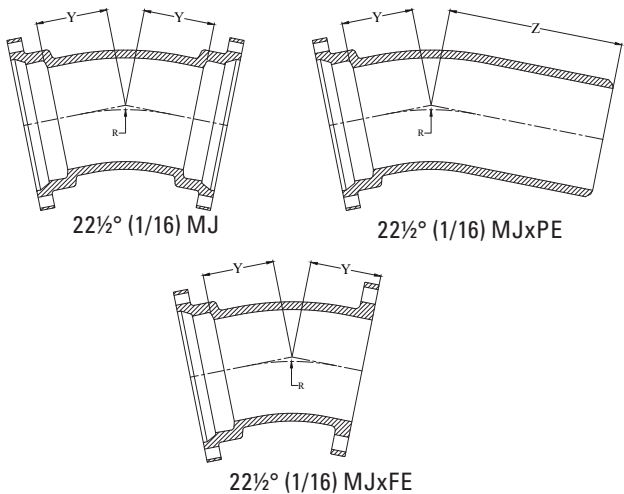
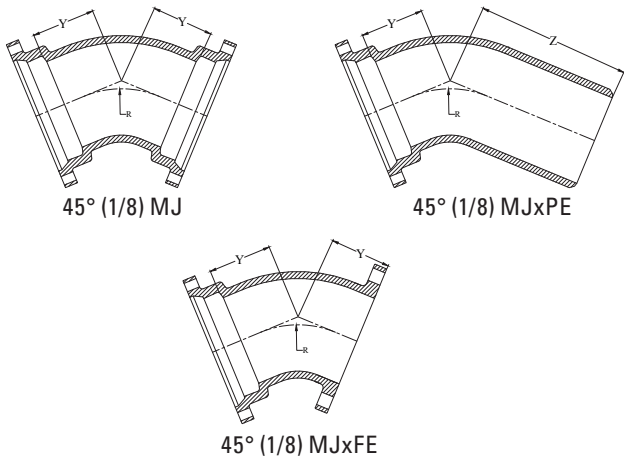
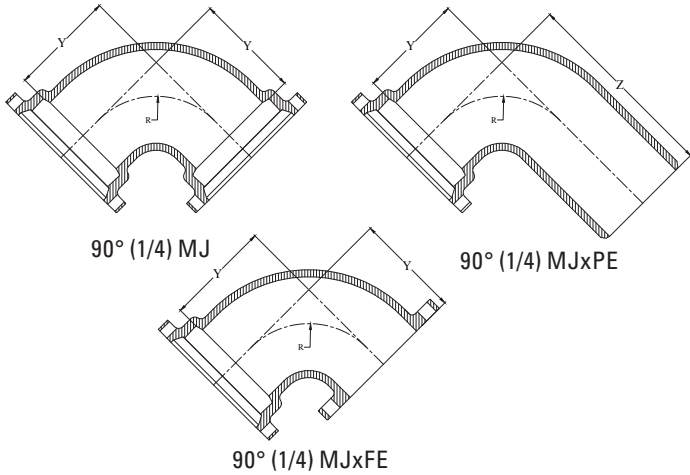
- SIZES:** 2" - 48"
- STANDARDS:** ANSI/AWWA C110/A21.10, NFPA 13/24, 3" - 12" UL listed and approved (File - Tyler Union)
- MATERIAL:** Cast of ASTM A536 qualified ductile iron. Date code is cast on and required for traceability.
- PRESSURE RATING:** *Flanged fittings rated at 250 psi. Mechanical joints 2" - 24" rated at 350 psi and 30" - 48" at 250 psi.
*Note: With rubber annular ring flange gasket, 2" - 24" Flanged fittings can be rated at 350 psi.
Note: Wyes over 12" are not pressure rated. Contact Tyler Union for rating in your application.
- DEFLECTION:** Joint deflection 5° max for 2"- 12" and 3° max for 14"- 48". Reduces by 50% at nominal pipe & fitting diameters
- NSF-61 & NSF372:** Meets all requirements including Annex G, Tyler Union's Underwriters Laboratory listing MH16439.
- ASPHALT COATING:** Per ANSI/AWWA C104/A21.4 and ANSI/AWWA C110/A21.10.
- 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.
- 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 or AWWA C900/905.



NOMINAL JOINT DIMENSIONS IN INCHES

Size Inches	A Dia. DI Pipe	B Hub Depth	C Dia. GLAND	D Dia.	F Dia.	∅	X	J Dia. GLAND	K ¹ Dia.	K ² Dia. GLAND	L	M GLAND	O	S	Qty. BOLTS
2	2.51	2.50	3.39	3.50	2.61	28°	3/4	4.75	6.25	6.25	0.73	0.62	0.31	0.44	2
3	3.96	2.50	4.84	4.94	4.06	28°	3/4	6.19	7.69	7.69	0.94	0.62	0.31	0.52	4
4	4.80	2.50	5.92	6.02	4.90	28°	7/8	7.50	9.12	9.12	1.00	0.75	0.31	0.65	4
6	6.90	2.50	8.02	8.12	7.00	28°	7/8	9.50	11.12	11.12	1.06	0.88	0.31	0.70	6
8	9.05	2.50	10.17	10.27	9.15	28°	7/8	11.75	13.37	13.37	1.12	1.00	0.31	0.75	6
10	11.10	2.50	12.22	12.34	11.20	28°	7/8	14.00	15.69	15.62	1.19	1.00	0.31	0.80	8
12	13.20	2.50	14.32	14.44	13.30	28°	7/8	16.25	17.94	17.88	1.25	1.00	0.31	0.85	8
14	15.30	3.50	16.40	16.54	15.44	28°	7/8	18.75	20.31	20.25	1.31	1.25	0.31	0.89	10
16	17.40	3.50	18.50	18.64	17.54	28°	7/8	21.00	22.56	22.50	1.38	1.31	0.31	0.97	12
18	19.50	3.50	20.60	20.74	19.64	28°	7/8	23.25	24.83	24.75	1.44	1.38	0.31	1.05	12
20	21.60	3.50	22.70	22.84	21.74	28°	7/8	25.50	27.08	27.00	1.56	1.44	0.31	1.12	14
24	25.80	3.50	26.90	27.04	25.94	28°	7/8	30.00	31.58	31.50	1.62	1.56	0.31	1.22	16
30	32.00	4.00	33.29	33.46	32.17	20°	1-1/8	36.88	39.12	39.12	1.81	2.00	0.38	1.50	20
36	38.30	4.00	39.59	39.76	38.47	20°	1-1/8	43.75	46.00	46.00	2.00	2.00	0.38	1.80	24
42	44.50	4.00	45.79	45.96	44.67	20°	1-3/8	50.62	53.12	53.12	2.00	2.00	0.38	1.95	28
48	50.80	4.00	52.09	52.26	50.97	20°	1-3/8	57.50	60.00	60.00	2.00	2.00	0.38	2.20	32

C110 DUCTILE IRON FULL BODY FITTINGS



*Not included in ASSA C110.

90° (1/4) BENDS

Size	Domestic						Import	
	R	Y	Z	Weight			Weight	
				MJxMJ	MJxPE	MJxFE	MJ	MJxPE
*2	2.30	3.30	—	16	—	—	—	—
3	4.00	5.50	13.50	26	36	—	35	35
4	4.50	6.50	14.50	56	53	47	55	50
6	6.00	8.00	16.00	88	80	75	88	97
8	7.00	9.00	17.00	123	119	118	136	153
10	9.00	11.00	19.00	182	181	170	190	190
12	10.00	12.00	20.00	280	252	246	255	255
14	11.50	14.00	22.00	380	—	—	400	—
16	12.50	15.00	23.00	552	—	465	480	410
18	14.00	16.50	24.50	625	600	591	641	577
20	15.50	18.00	26.00	862	775	—	725	650
24	18.50	22.00	30.00	1423	1301	1150	1020	985
30	21.50	25.00	33.00	1942	1920	—	1843	1585
36	24.50	28.00	36.00	2629	2310	—	2513	2310
42	27.50	31.00	—	3410	—	—	3410	—
48	30.50	34.00	—	4595	—	—	4595	—

45° (1/8) BENDS

Size	Domestic						Import	
	R	Y	Z	Weight			Weight	
				MJ	MJxFE	MJxPE	MJ	MJxPE
*2	1.96	1.80	—	12	—	—	—	—
3	3.62	3.00	11.00	30	—	—	30	30
4	4.81	4.00	12.00	53	48	45	49	48
6	7.25	5.00	13.00	77	60	69	77	81
8	8.44	5.50	13.50	110	107	111	117	123
10	10.88	6.50	14.50	156	148	167	155	168
12	13.25	7.50	15.50	214	215	196	223	215
14	12.06	7.50	15.50	300	—	—	270	—
16	13.25	8.00	16.00	391	—	349	335	320
18	14.50	8.50	16.50	527	416	455	467	395
20	16.88	9.50	17.50	631	543	537	527	500
24	18.12	11.00	19.00	880	1099	825	754	715
30	27.75	15.00	23.00	1898	—	1510	1451	1275
36	35.00	18.00	26.00	2372	—	1930	2176	1930
42	42.25	21.00	—	3020	—	—	2955	—
48	49.50	24.00	—	4170	—	—	4080	—

22 1/2° (1/16) BENDS

Size	Domestic						Import	
	R	Y	Z	Weight			Weight	
				MJ	MJxFE*	MJxPE	MJ	MJxPE
3	7.56	3.00	11.00	30	—	—	30	—
4	10.06	4.00	12.00	52	—	—	51	45
6	15.06	5.00	13.00	77	71	70	75	70
8	17.62	5.50	13.50	110	107	163	108	108
10	22.62	6.50	14.50	156	155	163	159	160
12	27.62	7.50	15.50	214	215	212	199	220
14	25.12	7.50	15.50	300	—	—	275	—
16	27.62	8.00	16.00	391	344	334	318	325
18	30.19	8.50	16.50	527	422	423	430	405
20	35.19	9.50	17.50	631	—	575	545	505
24	37.69	11.00	19.00	880	800	930	758	725
30	57.81	15.00	23.00	1898	—	1540	1400	1400
36	72.88	18.00	26.00	2372	—	1970	2121	1970
42	88.00	21.00	—	3020	—	—	3020	—
48	103.06	24.00	—	4170	—	—	4170	—

Tyler Union does not recommend the use of wedge action restraints on plain end fittings

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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