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Pipe needs to be grooved
joint pipe with flexible grooved
joint coupler.
See permanent water line
special provision for full list of
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There was no information
provided about the pipe
insulation.

MCWANE DUCTILE IRON PIPE



NSF 61



ISO 9001



DIPRA



Boltless restrained joint systems • Multiple design options available from 3"–36" •
Fast and easy installation • 350 psi pressure rating • Independently tested



Vermont Agency of Transportation
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CK'D BY D. PETERSON OK'D BY C. CARLSON

January 8, 2015

RESUBMIT YES

Rejected

BY C. CARLSON

DATE 01/12/2015

TYTON® AND FASTITE® PUSH-ON JOINTS

ASSEMBLY INSTRUCTIONS

- Step 1. Thoroughly clean out the bell with special attention to the gasket recess. Remove any foreign material or excess paint. Clean the spigot or beveled plain end and remove any sharp edges with a standard file.
- Step 2. After making sure that the correct gasket is being used, insert it into the recess in the bell with the small end of the gasket facing the bell face.
- Step 3. Apply lubricant to the inside surface of the gasket, making sure that the entire surface is coated. Apply a generous coating of lubricant to the beveled portion of the plain end.
- Step 4. Guide the plain end into the bell and, while maintaining straight alignment, push the plain end into the bell socket. Once the joint is assembled, necessary deflection can be accomplished. When assembly is complete, the bell face should be aligned between the two white depth rings, for Tyton® Joints. Fastite® Joints have only 1 assembly stripe.

MECHANICAL JOINT

ASSEMBLY INSTRUCTIONS

- Step 1. Clean the bell socket and spigot or plain end. Lubricate both the gasket and plain end by brushing an approved pipe lubricant.
- Step 2. Place the gland on the plain end with the lip extension toward the plain end. Place the gasket on the plain end with the narrow edge facing the plain end.
- Step 3. Insert the plain end into the bell and press the gasket into the bell recess. Push the gland toward the socket and center it around the pipe with the gland lip against the gasket.
- Step 4. Insert and tighten the bolts. It is important to maintain the same distance between the gland and the bell face at all times. This is best done by alternating side to side and top to bottom, while tightening the bolts.

Note: Achieving the recommended bolt torque, particularly with large diameter pipe, may require repeating the process up to 5 times or more. Recommended bolt torque ranges are as follows:

Pipe Size In.	Bolt Diameter In.	Nut Across Flats In.	Wrench Length In.	Torque Range Foot Lbs.
3	5/8	1-1/16	8	45 to 60
4-24	3/4	1-1/4	10	75 to 90

NOMINAL THICKNESS FOR STANDARD PRESSURE CLASSES OF DUCTILE IRON PIPE

Size In.	Outside Diameter In.	Pressure Class*				
		150	200	250	300	350
Normal Thickness — in.						
3	3.96	—	—	—	—	0.25**
4	4.80	—	—	—	—	0.25**
6	6.90	—	—	—	—	0.25**
8	9.05	—	—	—	—	0.25**
10	11.10	—	—	—	—	0.26
12	13.20	—	—	—	—	0.28
14	15.30	—	—	0.28	0.30	0.31
16	17.40	—	—	0.30	0.32	0.34
18	19.5	—	—	0.31	0.34	0.36
20	21.60	—	—	0.33	0.36	0.38
24	25.80	—	0.33	0.37	0.40	0.43
30	32.00	0.34	0.38	0.42	0.45	0.49
36	38.30	0.38	0.42	0.47	0.51	0.56

* Pressure Classes are defined as the rated water pressure of the pipe in psi. The thicknesses shown are adequate for the rated water working pressure plus a surge allowance of 100 psi. Calculations are based on a minimum yield strength of 42,000 and a 2.0 safety factor times the sum of the working pressure and 100 psi surge allowance.

** Calculated thicknesses for these sizes and pressure ratings are less than those shown above. Presently, these are the lowest nominal thicknesses available in these sizes.

NOTE: Per ANSI/AWWA C150/A21.50 the thicknesses above include the 0.08" service allowance and the casting tolerance listed below by size ranges:

SIZE (Inches)	CASTING TOLERANCES (Inches)
3-8	-0.05
10-12	-0.06
14-36	-0.07

TR FLEX® RESTRAINED JOINT

ASSEMBLY INSTRUCTIONS

- Step 1. (4"–10") Lay pipe such that one of the bell slots is accessible.
(12"–20") Lay pipe such that both of the bell slots are accessible, in the horizontal position if possible.
(24"–36") Lay pipe such that all four of the bell slots are accessible, in the diagonal position if possible.
- Step 2. Clean the bell socket and insert gasket.
- Step 3. Clean the spigot end to the assembly stripes.
- Step 4. Lubricate the exposed surface of the gasket and pipe spigot end back to the weld bead.
- Step 5. Make a normal push-on joint assembly, completely homing the pipe until the first assembly strip is in the bell socket. Keeping the joint in straight alignment during the assembly process.
- Step 6. (4"–10") Insert the right-hand locking segment into a bell slot and slide the segment clockwise around the pipe.
(12"–36") Insert lower locking segment into a bell slot and slide the segment around the pipe.
- Step 7. (4"–10") Insert left-hand locking segment into the bell slot and slide the segment counter-clockwise around the pipe.
(12"–36") Insert upper locking segment into the same bell slot and rotate around the pipe.
- Step 8. (4"–10") Hold the segments apart and wedge the rubber retainer into the slot between the two locking segments.
(12"–36") Hold the upper segment in place and wedge the rubber retainer into the slot between the two locking segments.
- Step 9. (4"–10") None.
(12"–20") Repeat steps 6–8 for other slot. Make sure that all 4 locking segments and 2 rubber retainers are securely in place.
(24"–36") Repeat steps 6–8 for other slot. Make sure that all 8 locking segments and 4 rubber retainers are securely in place.
- Step 10. Extend the joint to remove the slack in the locking segment cavity. Joint extension is necessary to attain the marked laying length on the pipe and to minimize growth or extension of the line as it is pressurized.
- Step 11. Set the joint deflection as required.

THRUST-LOCK™ RESTRAINED JOINT

ASSEMBLY INSTRUCTIONS

- Step 1. Ring Installation. Put lock ring on the spigot end of the pipe. Pry the lock ring over the weldment. Use the hammer to tap the cover. Lock ring installation is complete.
- Step 2. Clean the Bell and Spigot. Thoroughly clean out the bell with special attention to the gasket recess. Remove any foreign material or excess paint. Clean the spigot end and remove any sharp edges.
- Step 3. Insert the gasket into the recess in the bell with the small end of the gasket facing the bell face.
- Step 4. Lubricate the Bell and Spigot. Apply lubricant to the inside surface of the gasket. Apply a generous coating of lubricant to the spigot end.
- Step 5. Insert Pipe. Guide the spigot end into the bell and, while maintaining straight alignment, push the pipe into the bell socket.
- Step 6. Insert Lock Ring. Push lock ring into the bell.
- Step 7. Rotate the lock ring until the lugs align. Use a hammer to tap the ring if required. Install the anti-rotation wedges at 3 and 9 o'clock if the pipe is being used inside of a casing. Deflect the

Vermont Agency of Transportation

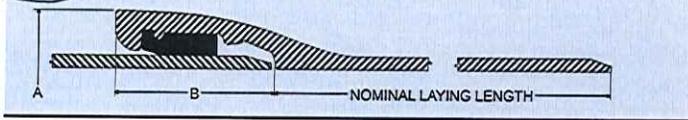
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SUPER-LOCK™ ASSEMBLY INST

- Step 1. Reformed dirt
CK'D BY D. PETERSON OK'D BY C. CARLSON
- Step 2. Ass 13) gasl
January 8, 2015
- Step 3. Guir joint
RESUBMIT YES Rejected
BY C. CARLSON DATE 01/12/2015
- Step 4. At drilled hole on retainer O.D., insert retainer lock in recess formed by lugs on bell and retainer. Insert roll pin in drilled hole and drive flush with retainer O.D.
- Step 5. Take any necessary deflection after joint is completely assembled.

Caution: do not over deflect the joint beyond the maximum deflection column specified on page 2 or subject the joint to bending stress to obtain additional deflection.

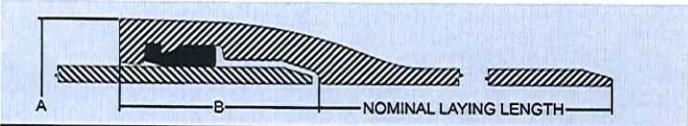
TYTON® AND FASTITE® JOINT PIPE



Tyton® Joint

Pipe Size In.	Pipe Thickness In.		Outside Diameter In.	*Dimensions In.	
	From	To		A	B
3	.25	.40	3.96	5.80	3.00
4	.25	.41	4.80	7.10	3.15
6	.25	.43	6.90	8.63	3.38
8	.25	.45	9.05	10.94	3.69
10	.26	.47	11.10	13.32	3.75
12	.28	.49	13.20	15.06	3.75
14	.28	.51	15.30	17.80	5.00
16	.30	.52	17.40	19.98	5.00
18	.31	.53	19.50	22.00	5.00
20	.33	.54	21.60	24.12	5.25
24	.33	.56	25.80	28.43	5.50
30	.34	.63	32.00	35.40	6.55
36	.38	.73	38.30	41.84	7.00

*Nominal laying length is 18 ft.

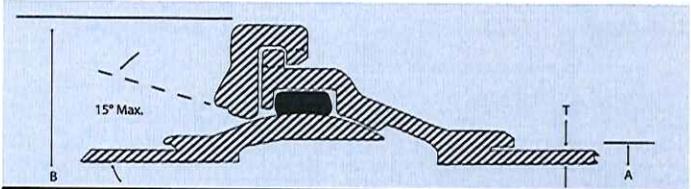


Fastite® Joint

Pipe Size In.	Pipe Thickness In.		Outside Diameter In.	*Dimensions In.	
	From	To		A	B
30	.34	.63	32.00	34.95	6.50
36	.38	.73	38.30	41.37	6.50

*Nominal laying length is 18 ft.

BALL AND SOCKET JOINT PIPE



Pipe Size In.	Thickness		A Pipe O.D.	B Retainer O.D.	Full Length Weight - Lb.**			Safe End Pull Lb.
	Class (A21.51)	T			As Shipped	Under Water		
						Full of Air	Full of Water	
6	55	.40	6.90	13.88	545	240	465	50,000
8	55	.42	9.05	16.63	770	240	655	70,000
10	55	.44	11.10	19.13	1005	220	860	95,000
12	55	.46	13.20	22.00	1270	155	1080	120,000
14	56	.51	15.30	24.50	1655	160	1410	145,000
16	56	.52	17.40	27.00	1990	45	1685	165,000
18	56	.53	19.50	30.00	2375	-70	2015	195,000
	58*	.59			2560	110	2170	
20	56	.54	21.60	32.75	2810	-200	2375	210,000
	59*	.63			3110	100	2635	
24	56	.56	25.80	38.25	3700	-620	3110	260,000
	62*	.74			4415	95	3715	
30	58	.71	32.00	46.25	5855	-900	4920	335,000
	61*	.83			6435	-180	5360	
36	57	.78	38.30	54.25	8145	-1300	6880	400,000
	59*	.88			8725	-725	7330	

* Thickness required to overcome buoyancy.

** Weights listed are for 18'-0" laying lengths. Nominal full lengths vary by size.

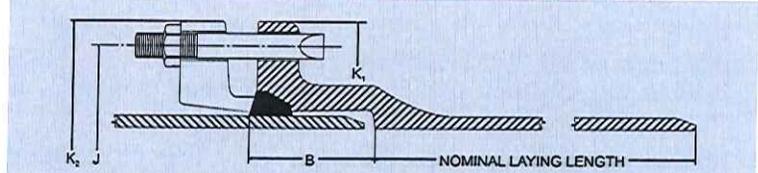
Pipe, Bell, Ball and Retainer are ductile iron.

Dimensions and weights are subject to manufacturing tolerances.

6"-24" pressure rating: 350 psi

30"-36" pressure rating: 250 psi

MECHANICAL JOINT PIPE



Pipe Size In.	Pipe Thickness In.		Outside Diameter In.	*Dimensions In.						Bolts		Bell Weight Lb.	Gland** Bolts Gasket Weight Lb.
	From	To		B	J	K1	K2	No.	Size In.	Length In.			
3	.25	.40	3.96	2.50	6.19	7.62	7.69	4	5/8	3	11	7	
4	.26	.41	4.80	2.50	7.50	9.06	9.12	4	3/4	3-1/2	16	10	
6	.25	.43	6.90	2.50	9.50	11.06	11.12	6	3/4	3-1/2	18	16	
8	.27	.45	9.05	2.50	11.75	13.31	13.37	6	3/4	4	24	25	
10	.29	.47	11.10	2.50	14.00	15.62	15.62	8	3/4	4	31	30	
12	.31	.49	13.20	2.50	16.25	17.88	17.88	8	3/4	4	37	40	
14	.33	.51	15.30	3.50	18.75	20.25	20.25	10	3/4	4-1/2	61	45	
16	.34	.52	17.40	3.50	21.00	22.50	22.50	12	3/4	4-1/2	74	55	
18	.35	.53	19.50	3.50	23.25	24.75	24.75	12	3/4	4-1/2	85	65	
20	.36	.54	21.60	3.50	25.50	27.00	27.00	14	3/4	4-1/2	98	85	
24	.38	.56	25.80	3.50	30.00	31.50	31.50	16	3/4	5	123	105	

* Nominal laying length is 18 ft.

** Weight shown for regular grey cast iron follower gland, corton bolts, and rubber gasket.

STANDARD DIMENSIONS AND WEIGHTS OF 3" THROUGH 36" PUSH-ON JOINT DUCTILE IRON PIPE

Pipe Size In.	Pressure Class psi	Nominal Thickness In.	OD* In.	Wt. of Barrel Per Ft. † Lb.	Tyton® Joint		
					Wt. of Bell Lb.	Wt. Per Lgth. † Lb.	Avg. Wt. Per Ft. † Lb.
3	350	0.25	3.96	8.90	7.00	185	9.20
4	350	0.25	4.80	10.90	9.00	225	11.30
6	350	0.25	6.90	16.00	11.00	300	16.60
8	350	0.25	9.05	21.10	17.00	395	22.00
10	350	0.26	11.10	27.10	24.00	510	28.40
12	350	0.28	13.20	34.80	29.00	655	36.40
	250	0.28	15.30	40.40	45.00	770	42.90
14	300	0.30	15.30	43.30	45.00	825	45.80
	350	0.31	15.30	44.70	45.00	850	47.20
	250	0.30	17.40	49.30	54.00	940	52.30
16	300	0.32	17.40	52.50	54.00	1000	55.50
	350	0.34	17.40	55.80	54.00	1060	58.80
18	250	0.31	19.50	57.20	59.00	1090	60.50
	300	0.34	19.50	62.60	59.00	1185	65.90
	350	0.36	19.50	66.20	59.00	1250	69.50
20	250	0.33	21.60	67.50	74.00	1290	71.60
	300	0.36	21.60	73.50	74.00	1395	77.60
	350	0.38	21.60	77.50	74.00	1470	81.60
24	200	0.33	25.80	80.80	95.00	1550	86.10
	250	0.37	25.80	90.50	95.00	1725	95.80
	300	0.40	25.80	97.70	95.00	1855	103.00
30**	350	0.43	25.80	104.90	95.00	1985	110.20
	150	0.34	32.00	103.50	139.00	2000	111.20
	200	0.38	32.00	115.50	139.00	2220	123.20
36**	250	0.42	32.00	127.50	139.00	2435	135.20
	300	0.45	32.00	136.50	139.00	2595	144.20
	350	0.49	32.00	148.40	139.00	2810	156.10
36**	150	0.38	38.30	138.50	184.00	2675	148.70
	200	0.42	38.30	152.90	184.00	2935	163.10
	250	0.47	38.30	170.90	184.00	3260	181.10
	300	0.51	38.30	185.30	184.00	3520	195.50
350	0.56	38.30	203.20	184.00	3840	213.40	

† Including bell; calculated weight of pipe rounded off to the nearest 5 lb.

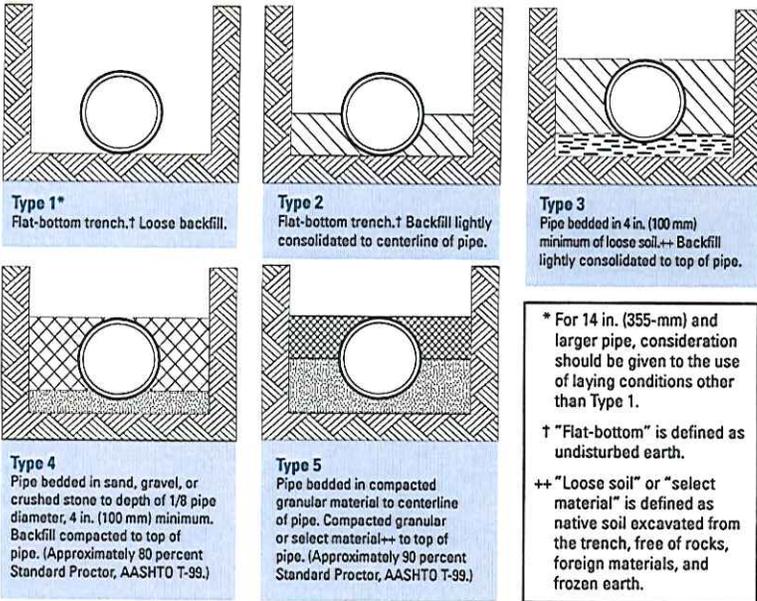
‡ Including bell; average weight per foot, based on calculated weight of pipe before rounding.

* Tolerances of OD of spigot end: 3-12 in. = +0.06 in. & -0.06 in.; 14-24 in. = +0.05 in. & -0.08 in.;

30-36 in. = +0.08 in. & -0.06 in.

** Fastite® Joint

LAYING CONDITIONS



Notes:
Consideration of the pipe-zone embedment conditions included in this figure may be influenced by factors other than pipe strength. For additional information on pipe bedding and backfill, see ANSI/AWWA C600.

American Association of State Highway and Transportation Officials, 444 N. Capitol St. N.W., Suite 225, Washington, DC 20001.

STANDARDS APPLICABLE TO DUCTILE IRON PIPE AND FITTINGS

THICKNESS DESIGN OF DUCTILE IRON PIPE	ANSI/AWWA C150/A21.50
DUCTILE IRON PIPE FOR WATER AND OTHER LIQUIDS	ANSI/AWWA C151/A21.51
	FEDERAL WWP421D, Grade C
DUCTILE IRON PIPE FOR GRAVITY FLOW SERVICE	ANSI/ASTM A746
DUCTILE IRON FITTINGS FOR WATER AND OTHER LIQUIDS	
3" through 36"	ANSI/AWWA C110/A21.10
DUCTILE IRON COMPACT FITTINGS	
3" through 24"	ANSI/AWWA C153/A21.53
FLANGED FITTINGS	ANSI/AWWA C110/A21.10
	ANSI B16.1
DUCTILE IRON PIPE WITH THREADED FLANGES	ANSI/AWWA C115/21.15
COATINGS AND LININGS	
Asphaltic	ANSI/AWWA C151/A21.51
	ANSI/AWWA C110/A21.10
	ANSI/AWWA C153/A21.53
Cement Lining	ANSI/AWWA C104/A21.4
Various Epoxy Linings and Coatings	MANUFACTURER'S STANDARD
Exterior Polyethylene Encasement	ANSI/AWWA C105/A21.5
JOINTS - PIPE AND FITTINGS	
Push-On and Mechanical Rubber-Gasket Joints	ANSI/AWWA C111/A21.11
	FEDERAL WWP421D
Flanged	ANSI/AWWA C115/A21.15
	ANSI B16.1
Grooved and Shouldered	ANSI/AWWA C606
PIPE THREADS	ANSI B2.1
INSTALLATION	ANSI/AWWA C600

DIMENSION AND WEIGHTS FOR SPECIAL CLASSES OF PUSH-ON JOINT AND MECHANICAL JOINT DUCTILE IRON PIPE

Pipe Size In.	Thickness Class	Nominal Thickness In.	OD* In.	Wt. of Barrel Per Ft. † Lb.	Tyton® Joint		
					Wt. of Bell Lb.	Wt. Per Lgth. † Lb.	Avg. Wt. Per Ft. ‡ Lb.
3	52	.28	3.96	9.90	9	205	10.40
3	54	.34	3.96	11.80	9	245	12.20
4	51	.26	4.80	11.30	11	235	11.80
4	52	.29	4.80	12.60	11	265	13.20
4	53	.32	4.80	13.80	11	285	14.40
4	54	.35	4.80	15.00	11	310	15.60
6	50	.25	6.90	16.00	13	300	16.70
6	51	.28	6.90	17.80	13	335	18.50
6	52	.31	6.90	19.60	13	365	20.30
6	53	.34	6.90	21.40	13	400	22.10
6	54	.37	6.90	23.20	13	430	23.90
6	55	.40	6.90	25.00	13	465	25.70
6	56	.43	6.90	26.70	13	490	27.40
8	50	.27	9.05	22.80	20	430	23.90
8	51	.30	9.05	25.20	20	480	26.30
8	52	.33	9.05	27.70	20	525	28.80
8	53	.36	9.05	30.10	20	570	31.20
8	54	.39	9.05	32.50	20	610	33.60
8	55	.42	9.05	34.80	20	650	35.90
8	56	.45	9.05	37.20	20	695	38.30
10	50	.29	11.10	30.10	27	575	31.60
10	51	.32	11.10	33.20	27	630	34.70
10	52	.35	11.10	36.20	27	685	37.70
10	53	.38	11.10	39.20	27	740	40.70
10	54	.41	11.10	42.10	27	790	43.60
10	55	.44	11.10	45.10	27	845	46.60
10	56	.47	11.10	48.00	27	900	49.50
12	50	.31	13.20	38.40	31	735	40.10
12	51	.34	13.20	42.00	31	800	43.70
12	52	.37	13.20	45.60	31	865	47.30
12	53	.40	13.20	49.20	31	930	50.90
12	54	.43	13.20	52.80	31	995	54.50
12	55	.46	13.20	56.30	31	1055	58.00
12	56	.49	13.20	59.90	31	1120	61.60
14	50	.33	15.30	47.50	59	915	50.80
14	51	.36	15.30	51.70	59	990	55.00
14	52	.39	15.30	55.90	59	1065	59.20
14	53	.42	15.30	60.10	59	1140	63.40
14	54	.45	15.30	64.20	59	1215	67.50
14	55	.48	15.30	68.40	59	1290	71.70
14	56	.51	15.30	72.50	59	1365	75.80
16	50	.34	17.40	55.80	65	1070	59.40
16	51	.37	17.40	60.60	65	1155	64.20
16	52	.40	17.40	65.40	65	1240	69.00
16	53	.43	17.40	70.10	65	1325	73.70
16	54	.46	17.40	74.90	65	1415	78.50
16	55	.49	17.40	79.70	65	1500	83.30
16	56	.52	17.40	84.40	65	1585	88.00
18	50	.35	19.50	64.40	74	1235	68.50
18	51	.38	19.50	69.80	74	1330	73.90
18	52	.41	19.50	75.20	74	1420	79.20
18	53	.44	19.50	80.60	74	1510	84.50
18	54	.47	19.50	86.00	74	1600	89.80
18	55	.50	19.50	91.40	74	1690	95.10
18	56	.53	19.50	96.80	74	1780	100.40
20	50	.36	21.60	73.60	83	1365	78.60
20	51	.39	21.60	79.50	83	1465	84.50
20	52	.42	21.60	85.40	83	1565	90.40
20	53	.45	21.60	91.30	83	1665	96.30
20	54	.48	21.60	97.20	83	1765	102.20
20	55	.51	21.60	103.10	83	1865	108.10
20	56	.54	21.60	109.00	83	1965	114.00
24	50	.37	23.70	82.80	92	1455	88.70
24	51	.40	23.70	89.30	92	1565	95.20
24	52	.43	23.70	95.80	92	1675	101.70
24	53	.46	23.70	102.30	92	1785	108.20
24	54	.49	23.70	108.80	92	1895	114.70
24	55	.52	23.70	115.30	92	2005	121.20
24	56	.55	23.70	121.80	92	2115	127.70
30**	50	.39	32.00	118.50	170	2305	127.90
30**	51	.43	32.00	130.50	170	2520	139.90
30**	52	.47	32.00	142.50	170	2735	151.90
30**	53	.51	32.00	154.40	170	2950	163.80
30**	54	.55	32.00	166.30	170	3165	175.70
30**	55	.59	32.00	178.20	170	3380	187.60
30**	56	.63	32.00	190.00	170	3590	199.40
36**	50	.43	38.30	156.50	239	3055	169.80
36**	51	.48	38.30	174.50	239	3380	187.80
36**	52	.53	38.30	192.40	239	3700	205.70
36**	53	.58	38.30	210.30	239	4025	223.60
36**	54	.63	38.30	228.10	239	4345	241.40
36**	55	.68	38.30	245.90	239	4665	259.20
36**	56	.73	38.30	263.70	239	4985	277.00

Vermont Agency of Transportation

RECEIVED

CK'D BY D. PETERSON OK'D BY C. CARLSON

January 8, 2015

RESUBMIT YES Rejected

BY C. CARLSON DATE 01/12/2015

ATLANTIC STATES CAST IRON PIPE CO.
183 Sitgreaves St.
Phillipsburg, NJ 08855
908-454-1161
atlanticstates.com

CLOW WATER SYSTEMS COMPANY
2286 S. 6th St.
Coshocton, OH 43812
740-622-6651
clowwater.com

PACIFIC STATES CAST IRON PIPE CO.
1401 E 2000 S.
Provo, UT 84603
801-373-6910
pscipco.com

CANADA PIPE COMPANY ULC
1757 Burlington St. E
Hamilton, ON L8N-3R5
905-547-3251
canadapipe.com

MCWANE CAST IRON PIPE CO.
1201 Vanderbilt Road
Birmingham, AL 35234
205-322-3521
mcwanepipe.com

†Including bell; calculated weight of pipe rounded off to the nearest 5lb.
‡Including bell; average weight per foot, based on calculated weight of pipe before rounding.
*Tolerances of OD of spigot end; 3-12 in. ±0.06 in., 14-24 in. +0.05 in., -0.08 in., 30-36 in. +0.08 in., -0.06 in.
**Fastite® Joint

SURE STOP® GASKET FOR TYTON® JOINT

Size In.	Rating psi	Deflection Degrees
3	350	5
4	350	5
6	350	5
8	350	5
10	350	5
12	350	5
14	350	4
16	350	4
18	350	4
20	350	2.5
24	350	2.5

SURE STOP 350® GASKETS are available in sizes 3"–24", and with a rating of 350 psi they will meet or exceed the capabilities of ductile iron pipe, valves, and fittings.

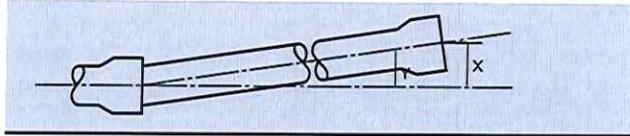
SURE STOP 350® GASKETS are NSF 61 approved, UL listed, and FM approved.

FM Rating: 4"–6" = 250 psi
18"–24" = 200 psi

APPLICATION NOTES

- For ductile iron applications utilizing TYTON® pipe, vales, and fittings made to AWWA specifications.
- In cold weather assembly maintain the temperature of the gasket above 40° F.
- The socket of the joint should be clean and free of debris or significant corrosion.
- Gasket should be properly seated in the bell socket.
- Keep the pipe and joint in alignment during assembly. If installed out of alignment, the gasket can be pushed out of position, creating the potential for leaks or failure.
- If deflection is wanted in the joint, deflect before fully inserting the joint.
- Some extension of the joint will occur when pressurized. To avoid this, the joint should be pulled out after assembly to "set" the stainless steel teeth in the inserted pipe.
- Once assembled, the joint can be disassembled using steel shims.
- When cut pipe is used, the following steps are required:
 - Ensure that the spigot end is properly beveled
 - Mark the joint depth on the spigot so it is clear when the joint is fully inserted.
 - Ensure that the pipe meets the required dimensional tolerances.
- Do not reuse SURE STOP 350® GASKETS, as they may have been damaged during any previous installation or during removal.
- Do not use SURE STOP 350® GASKETS to conduct electricity through the pipe joint, as they could be damaged and fail.
- Do not use SURE STOP 350® GASKETS in above ground applications.
- Do not use SURE STOP 350® GASKETS with thick coating on the pipe exterior.
- If SURE STOP 350® GASKETS are used in straight casings, you must pull the pipe through the casing. Do not push the pipe.

JOINT DEFLECTION CHART

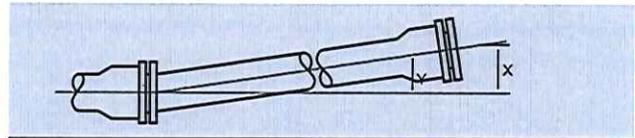


PUSH-ON JOINT PIPE

Maximum Allowable Joint Deflection

Pipe Size In.	Y-Maximum Joint Deflection in Degrees	X Deflection in Inches 18 ft. Length	Approximate Radius in ft. of Curve Produced by Succession of Joints 18 ft. Length
3	5°	19	205
4	5°	19	205
6	5°	19	205
8	5°	19	205
10	5°	19	205
12	5°	19	205
14	5°	19	205
16	5°	19	205
18	5°	19	205
20	5°	19	205
24	5°	19	205
30	5°	19	205
36	4°	15	260

MAXIMUM DEFLECTION FOR FULL LENGTH PIPE



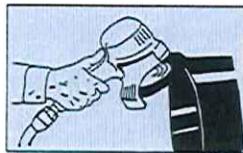
MECHANICAL JOINT PIPE

Maximum Allowable Joint Deflection

Pipe Size In.	Y-Maximum Joint Deflection in Degrees	X Deflection in Inches 18 ft. Length	Approximate Radius in ft. of Curve Produced by Succession of Joints 18 ft. Length
6	7°–7'	27	145
8	5°–21'	20	195
10	5°–21'	20	195
12	5°–21'	20	195
14	3°–35'	13.5	285
16	3°–35'	13.5	285
18	3°–0'	11	340
20	3°–0'	11	340
24	2°–23'	9	450

FIELD CUT PIPE

When pipe is cut in the field, the cut end may be readily conditioned so that it can be used to make up the next joint. The outside of the cut end should be beveled about 1/4-inch at an angle of about 30 degrees (Figure 1). This can be quite easily done with a coarse file or a portable grinder. The operation removes any sharp, rough edges which otherwise might damage the gasket.



When ductile iron pipe 14" and larger is to be cut in the field, the material should be ordered as "GAUGED FULL LENGTH". Pipe that is "gauged full length" is specially marked to avoid confusion. The ANSI/AWWA standard for ductile iron pipe requires factory gauging of the spigot end. Accordingly, pipe selected for field cutting should also be field gauged in the location of the cut and found to be within the tolerances shown in Table 1. In the field, a mechanical joint gland can be used as a gauging device.

TABLE 1: SUITABLE PIPE DIAMETERS FOR FIELD CUTS AND RESTRAINED JOINT FIELD FABRICATION

Pipe Size In.	Min. Pipe Diameter In.	Max. Pipe Diameter In.	Min. Pipe Circumference In.	Max. Pipe Circumference In.
3	3.9	4.02	12-1/4	12-5/8
4	4.74	4.86	14-29/32	15-9/32
6	6.84	6.96	21-1/2	21-7/8
8	8.99	9.11	28-1/4	28-5/8
10	11.04	11.16	34-11/16	35-1/16
12	13.14	13.26	41-9/32	41-21/32
14	15.22	15.35	47-13/16	48-7/32
16	17.32	17.45	54-13/32	54-13/16
18	19.42	19.55	61	61-13/32
20	21.52	21.65	67-19/32	68
24	25.72	25.85	80-13/16	81-7/32
30	31.94	32.08	100-11/32	100-25/32
36	38.24	38.38	120-1/8	120-9/16

Above Table Based on ANSI/AWWA C151/A21.51 Guidelines for Push-On Joints.

THE BACKHOE METHOD OF ASSEMBLY

A backhoe may be used to assemble pipe of intermediate and larger sizes. The plain end of the pipe should be carefully guided by hand into the bell of the previously assembled pipe. The bucket of the backhoe may then be used to push the pipe until fully seated. A timber header should be used between the pipe and backhoe bucket to avoid damage to the pipe.



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Tyler/Union

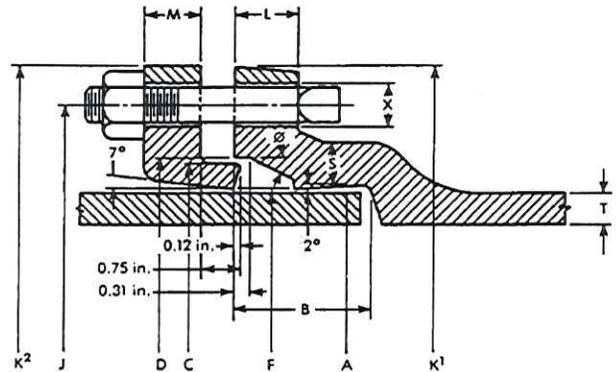
Mechanical Joint Compact Fittings SUBMITTAL

- SIZES:** 3" through 36"
- STANDARDS:** ANSI/AWWA C153/A21.53
- PRESSURE RATING:** 3"-24" @ 350 PSI; 30"-36" & fittings with flanged branches @ 250 PSI
- NSF-61:** Meets all requirements, UL Certified
- COATING:** ANSI/AWWA C104/A21.4 and Tnemec 140-1211
- CEMENT LINING:** ANSI/AWWA C104/A21.4, Double available
- EPOXY COATING:** ANSI/AWWA C116/A21.16
- BARE:** Available
- BOLTS:** ANSI/AWWA C111/A21.11
- INSTALLATION:** AWWA C600



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JOINT DIMENSIONS IN INCHES

BOLTS

Size	A Dia.	B	C Dia.	D Dia.	F Dia.	Ø	J Dia.	K' Dia.	K ² Dia.	L	M	S	T	X Dia.	Size	No.
3	3.96	2.50	4.84	4.94	4.06	28°	6.19	7.62	7.69	.58	.62	.39	.33	3/4	5/8x3	4
4	4.80	2.50	5.92	6.02	4.90	28°	7.50	9.06	9.12	.60	.75	.39	.34	7/8	3/4x3 1/2	4
6	6.90	2.50	8.02	8.12	7.00	28°	9.50	11.06	11.12	.63	.88	.43	.36	7/8	3/4x3 1/2	6
8	9.05	2.50	10.17	10.27	9.15	28°	11.75	13.31	13.37	.66	1.00	.45	.38	7/8	3/4x3 1/2	6
10	11.10	2.50	12.22	12.34	11.20	28°	14.00	15.62	15.62	.70	1.00	.47	.40	7/8	3/4x3 1/2	8
12	13.20	2.50	14.32	14.44	13.30	28°	16.25	17.88	17.88	.73	1.00	.49	.42	7/8	3/4x3 1/2	8
14	15.30	3.50	16.40	16.54	15.44	28°	18.75	20.31	20.25	.79	1.25	.56	.47	7/8	3/4x4	10
16	17.40	3.50	18.50	18.64	17.54	28°	21.00	22.56	22.50	.85	1.31	.57	.50	7/8	3/4x4	12
18	19.50	3.50	20.60	20.74	19.64	28°	23.25	24.83	24.75	1.00	1.38	.68	.54	7/8	3/4x4	12
20	21.60	3.50	22.70	22.84	21.74	28°	25.50	27.08	27.08	1.02	1.44	.69	.57	7/8	3/4x4	14
24	25.80	3.50	26.90	27.04	25.94	28°	30.00	31.58	31.50	1.02	1.56	.75	.61	7/8	3/4x4 1/2	16
30	32.00	4.00	33.29	33.46	32.17	20°	36.88	39.12	39.12	1.31	2.00	.82	.66	1 1/8	1x5 1/2	20
36	38.30	4.00	39.59	39.76	38.47	20°	43.75	46.00	46.00	1.45	2.00	1.00	.74	1 1/8	1x5 1/2	24



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Union Foundry Company • P.O. Box 309 • Anniston, Alabama 36202 • (256) 236-7901

Uni-Flange® Series 1400

Wedge Action MJ Retainer Gland Joint Restraint for Ductile Iron Pipe

WORKING PRESSURE - 3" THROUGH 16" 350 PSI
 - 18" THROUGH 36" 250 PSI

Actuating Screw -

Ductile iron wedge actuating screw, with the Auto-Tork break-away head design, ensures proper torque during installation.

Gland -

Gland body is of High Strength Ductile Iron per ASTM A536, Grade 65-45-12. Compatible with all mechanical joints conforming to ANSI / AWWA C111 / A21.11.

Color Code:

All components black epoxy coated applied by the ecoat process.



3" THROUGH 36" SIZES - 100% DUCTILE IRON CONSTRUCTION

Wedges are ductile iron and heat treated to a hardness of 370 BHN minimum.

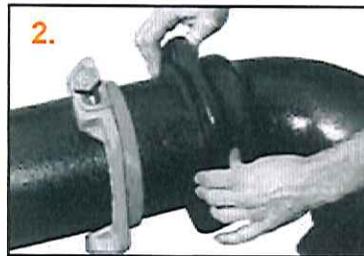
The Uni-Flange® Series 1400 offers a minimum 2:1 safety factor at the full rated pressure of the device, in all sizes, when tested in dead-end situations.

Note: UFR1400s are not to be used on plain end fittings.

Uni-Flange® Series 1400 Installation Instructions



1. Clean the socket and plain end. Lubricate gasket and plain end with approved pipe lubricant meeting AWWA C111. Place the gland on the plain end with the lip extension toward the plain end, followed by the gasket with the tapered edge of the gasket toward the plain end.



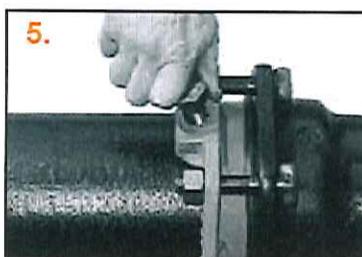
2. Insert the pipe into the socket and press the gasket firmly and evenly into the gasket recess. Keep the joint straight during assembly.



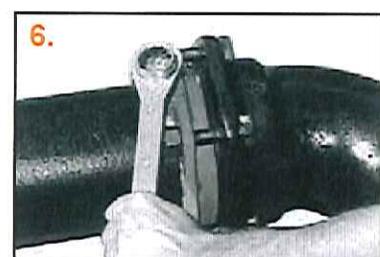
3. Push the gland toward the socket and center it around the pipe with the gland lip against the gasket. Hand tighten the Auto-Tork actuating screws to center the gland around the pipe. Insert T-bolts and hand tighten nuts. With the gland positioned and centered around the pipe, loosen the Auto-Tork actuating screws and continue to tighten the T-bolts. Set deflection after joint assembly but before tightening bolts (max. deflection is 5°).



4. Tighten the T-bolts to the same torque recommended in AWWA C111 (45-60 ft-lb on 3", 75-90 ft-lb on 4" - 24" sizes, 100-120 ft-lb on 30" - 36" sizes). Tighten in an alternating manner (12 o'clock, 6 o'clock, 9 o'clock, 3 o'clock), maintaining the same gap between the gland and the face of the MJ bell at all points around the MJ socket. Repeat the process until all bolts are within the approximate torque range. Use of a torque wrench is recommended.



5. After correct assembly of the mechanical joint, bring all wedges in contact with the pipe surface by turning the Auto-Tork actuating screws in a clockwise direction until contact is made and screw is "hard to turn".



6. Tighten each Auto-Tork actuating screw by turning approximately 180 degrees (1/2 turn), alternating among screws until the break away heads twist off.

Note: T twisted



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screw heads have been
 ew to 75 - 110 ft-lb.

U-30 FORD

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Uni-Flange® Series 1400

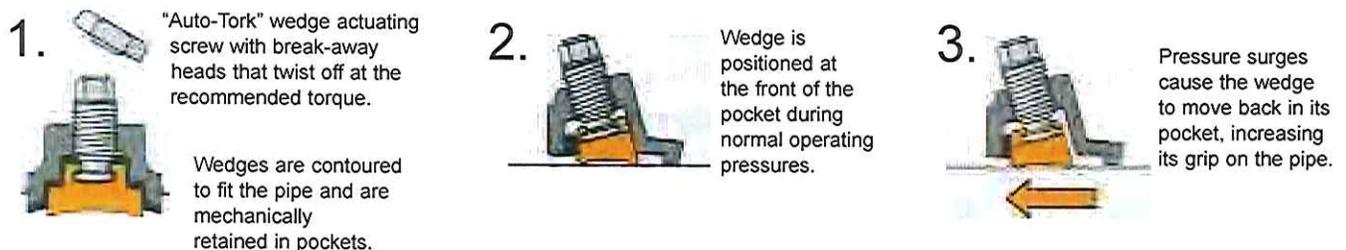
Information - Wedge Action MJ Retainer Gland for Ductile Iron Pipe

HISTORY

The Series 1400 was originally designed to provide joint restraint for ductile iron pipelines installed in areas subject to earthquakes. Its unique "controlled expansion and flexibility" feature has allowed it to withstand several major earthquakes; one as large as magnitude 7.7 in 1983 and another of magnitude 7.8 in 1993. Uni-Flange® has licensed this technology and has adapted the design to AWWA standards and dimensions.

HOW IT WORKS

The Series 1400 is a mechanical joint restraining gland, incorporating individually actuated wedges located around the circumference of the pipe. When the specially designed wedge actuating screws are tightened, the teeth on the bottom of each wedge lock onto the pipe surface. Under normal operating conditions, this is all the restraint that is required. If external forces cause the pipe to move, the wedge teeth remain locked on the pipe and the wedge moves against the actuating screw, enclosed in its ductile iron pocket. This feature allows the joint to prevent separation yet remain resilient and flexible after assembly. In high pressure applications, or when surge pressures occur, the 1400 uses the line pressure to increase its restraining grip on the pipe. If the pressure decreases, the wedge returns to its original position and controlled expansion and flexibility are available again.



ADVANTAGES OF THE SERIES 1400

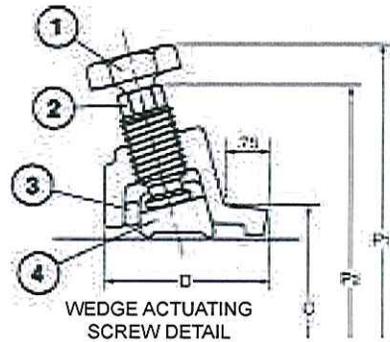
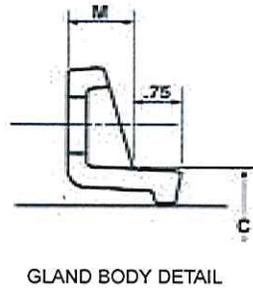
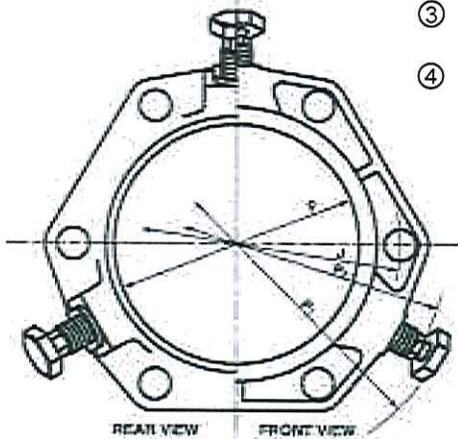
- **Eliminates** the need of costly and time consuming **concrete thrust blocks**.
- **"Auto-Tork" wedge actuating screws assure proper installation.** Auto-Tork screws are designed with a break away head that twists off at the recommended torque, leaving a hex head in case future maintenance or removal is required. This gives a visual indicator and ensures correct installation every time.
- **Wedges are contoured to fit the pipe.** This provides greater surface area contact, increasing the restraint capability and distributing the restraining force. The Series 1400 can be used on any thickness or class of ductile iron pipe.
- **High Pressure Capabilities.** The Series 1400 is rated at 350 psi in 3" - 16" nominal sizes, 250 psi in 18" - 36". Minimum 2:1 safety factor in all sizes.
- **Proven Technology.** The Series 1400 design has decades of successful field service.
- **The Series 1400 Offers 5° deflection** on sizes 3"-12", **3° deflection** on sizes 14"-24" and **1° deflection** on 30" and 36" sizes. This advantage is provided even after installation and pressurization.
- **No special tools necessary.** Designed for use with standard mechanical joint bells conforming to AWWA C111. The same wrench used to tighten the T-bolt nuts can be used on the wedge actuating screws.
- **Wedges are mechanically retained in pockets.** The Series 1400 wedges cannot fall out! All necessary parts show up at the job site and no parts are lost in the trench if the gland is removed from the pipe for system maintenance or relocation.
- **Used with ordinary ductile iron pipe and mechanical joint sockets.** There is no need to order, pay for, and wait for special factory fabricated parts. Totally field adaptable; no beveling, special segments, or welded rings required.
- **4" - 12" UL listed and FM approved.** Contact factory for details.



Uni-Flange® Series 1400

Information - Wedge Action MJ Retainer Gland Joint Restraint for Ductile Iron Pipe

- ① Auto-Tork break-away head, 1-1/4" across the flat (same as 3/4" heavy hex nut).
- ② 5/8" hex-head, operating screw.
- ③ Rubber spacer (positions wedge during assembly).
- ④ Wedge



Series 1400 Retainer Gland for Ductile Iron Pipe

NOM. PIPE SIZE	PIPE O.D. (INCHES)	CATALOG NUMBER	PRESSURE RATING (PSI)	No. OF WEDGES	APPROX. WEIGHT (LBS.)	P1*	P2**	C	D	F	M	J	No. OF BOLT HOLES
3"	3.96	UFR1400-D-3-(IorU)	350	2	6.0	11.04	9.06	4.84	2.65	4.06	0.68	6.19	4
4"	4.80	UFR1400-D-4-(IorU)	350	2	7.5	11.9	10.0	5.92	2.65	4.90	0.88	7.50	4
6"	6.90	UFR1400-D-6-(IorU)	350	3	11.0	14.0	12.1	8.02	2.65	7.00	0.88	9.50	6
8"	9.05	UFR1400-D-8-(IorU)	350	4	14.5	16.2	14.3	10.17	2.65	9.15	1.10	11.75	6
10"	11.10	UFR1400-D-10-(IorU)	350	6	22.0	18.2	16.3	12.22	2.75	11.20	1.10	14.00	8
12"	13.20	UFR1400-D-12-(IorU)	350	8	28.0	20.3	18.4	14.32	2.75	13.30	1.10	16.25	8
14"	15.30	UFR1400-D-14-(IorU)	350	10	42.0	22.9	20.9	16.40	3.00	15.44	1.50	18.75	10
16"	17.40	UFR1400-D-16-(IorU)	350	12	50.0	25.0	23.0	18.50	3.00	17.54	1.56	21.00	12
18"	19.50	UFR1400-D-18-(IorU)	250	12	67.0	28.1	25.8	20.60	3.05	19.64	1.65	23.25	12
20"	21.60	UFR1400-D-20-(IorU)	250	14	75.0	30.2	27.9	22.70	3.10	21.75	1.70	25.50	14
24"	25.80	UFR1400-D-24-(IorU)	250	16	85.0	34.4	32.1	26.90	3.20	25.94	1.85	30.00	16
30"	32.00	*** UFR1400-D-30-(IorU)	250	20	221.0	40.6	38.6	33.29	3.55	32.17	2.25	36.88	20
36"	38.30	*** UFR1400-D-36-(IorU)	250	24	256.0	46.9	44.9	39.59	3.76	38.47	2.25	43.75	24

I = Import Casting U = Domestic Casting

All dimensions in inches unless otherwise stated.

* Maximum O.D. of gland on pipe before break-away heads have been removed (as received).

** Maximum O.D. of gland on pipe after wedges have been activated and break-away heads have been removed.

*** 30" and 36" sizes include a Uni-Seal gasket.

Note: 4" - 12" oversized 1400 Retainer Glands are available for Class C and D gray cast iron (Color Coded Gray). To order these oversized units, add "-XL" to the end of the catalog number. Example: UFR1400-D-6-XL.

Note: Not to be used on plain end fittings.