

SHOP DRAWING TRANSMITTAL

DATE RETURNED: 3/26/2015	DATE SENT: 3/20/2015	PAGE <u>1</u> of <u>1</u>
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TO/FROM: TEL.# 518-453-4734 CHA III WINNERS CIRCLE ALBANY, NY 12205 ATTN:	TO/FROM: TEL.# () MARK SARGENT PROJECT MANAGER - STRUCTURES 1 NATIONAL LIFE DRIVE MONTPELIER, VT 05633-5001
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CHA PROJECT No.20615 CONTRACT No. BRF 3000(19) TITLE: RUTLAND CITY (RIPLEY ROAD)	
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SHOP DRAWING DATA: (TO BE FILLED IN BY CONTRACTOR) TOPIC: DUCTILE IRON PIPE, CEMENT LINED (8") SPECIFICATION: 629.24	
<i>DO NOT MIX SUBMISSIONS FROM DIFFERENT SPEC DIVISIONS ON THIS FORM. FILL OUT NEW FORM EACH TIME!</i>	FOR CHA'S RECEIVED STAMP.

THE ABOVE NAMED CONTRACTOR HAS EVALUATED EACH ITEM IDENTIFIED IN THIS TRANSMITTAL & CERTIFIES IT TO BE IN CONFORMANCE WITH THE CONTRACT DOCUMENTS.

****THIS SUBMITTAL IS NOT BEING PRESENTED AS A SUBSTITUTION****

CERTIFIED BY: _____ **TITLE:** _____ **DATE:** _____

ID NUMBER	QUANTITY		DESCRIPTION OF ITEM(S) BEING SUBMITTED <small>(Reference specification section and/or drawing number for each item being submitted)</small>	ENGINEER'S REVIEW STATUS
	SENT	RETURN		
629.24-01	1	1	Ductile Iron Pipe, Cement Lined (8")	NET

NET = NO EXCEPTIONS TAKEN **MCN** = MAKE CORRECTIONS NOTED **R&R** = REVISE AND RESUBMIT
REJ = REJECTED **SSI** = SUBMIT SPECIFIED ITEM **NR** = NOT REVIEWED
***RESUBMIT REQUIRED IF REVIEW STATUS IS R&R, REJ, SSI**

CONTRACTOR'S COMMENTS:	Engineer's Comments: None
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(FOR ENGINEER'S INTERNAL USE ONLY)

Forwarded To: DALE GOZALKOWSKI	DUE BACK TO CONTRACTOR: _____
Reviewed By: JAMES RASHFORD	DATE SENT: 3/20/2015
Returned to Contractor By: DALE GOZALKOWSKI	DATE RETURNED: 3/27/2015

(ENTER DATE ABOVE)



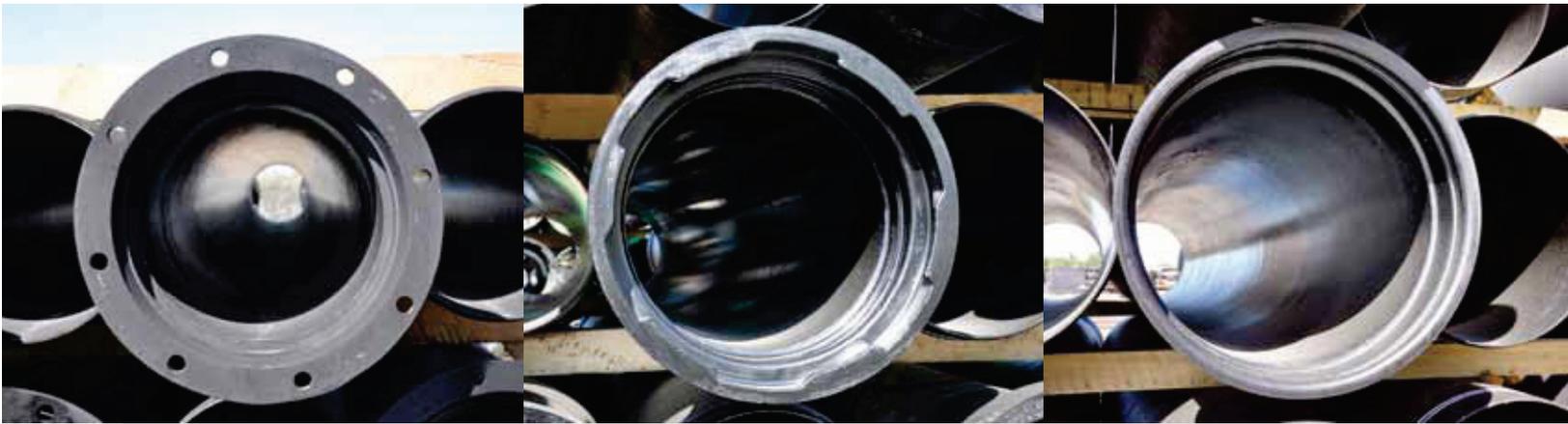
For Generations

- NO EXCEPTION TAKEN
- MAKE CORRECTIONS NOTED
- REJECTED
- REVISE AND RESUBMIT
- SUBMIT SPECIFIED ITEM

CHECKING IS ONLY FOR THE GENERAL CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND GENERAL COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. ANY ACTION SHOWN IS SUBJECT TO THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS. CONTRACTOR IS RESPONSIBLE FOR DIMENSIONS WHICH SHALL BE CONFIRMED AND CORRELATED AT THE JOB SITE; FABRICATION PROCESSES AND TECHNIQUES OF CONSTRUCTION; COORDINATION OF HIS WORK WITH THAT OF ALL OTHER TRADES AND THE SATISFACTORY PERFORMANCE OF THE WORK.

MCWANE RESTRAINED JOINT TILE IRON PIPE

CHA
DATE 3/27/2015 BY James Rashford



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



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.

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

**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.

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 to a bell slot and slide the segment clockwise around the pipe. MAKE CORRECTIONS NOTED
 (12" - 36") Insert lower locking segment into slot and slide the segment around the pipe. REVISE AND RESUBMIT
- Step 7. (4" - 10") Insert left-hand locking segment into the bell slot and slide the segment counter-clockwise around the pipe. SUBMIT SPECIFIED ITEM
(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 joining length on the pipe and to minimize growth or extension of the line as it is pulled.
- Step 11. Set the joint deflection as required.

DATE 3/27/2015

BY James Rashford

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 joint if desired.

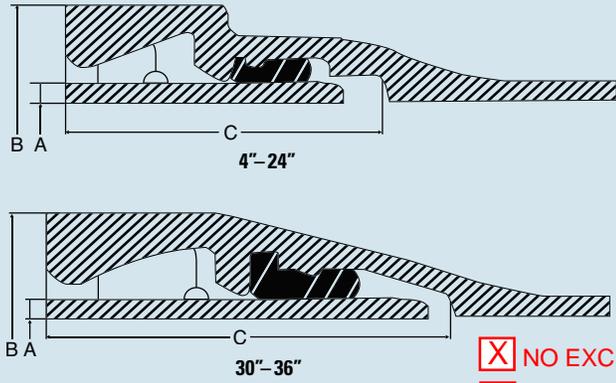
SUPER-LOCK®

ASSEMBLY INSTRUCTIONS

- Step 1. Remove hook bolts securing retainer to plain end. Clean plain end of pipe. Clean out any dirt behind retainer lugs. Lubricant should be applied to the beveled nose.
- Step 2. Assemble the joint in accordance with Clow Assembly Instructions (See Table A on page 13). Make certain that the bell is clean prior to gasket insertion. Be sure that the correct gasket is used.
- Step 3. Guide plain end into Super-Lock® bell and provide reasonably straight alignment. "Make" joint by pushing the plain end into the bell. A jack or come-a-long may also be used to pull the plain end into the bell. Position retainer so that the recesses line up with the lugs on the bell. Slide retainer over bell and rotate until the lugs on the bell and the retainer line up.
- 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.

TR FLEX® RESTRAINED JOINT PIPE



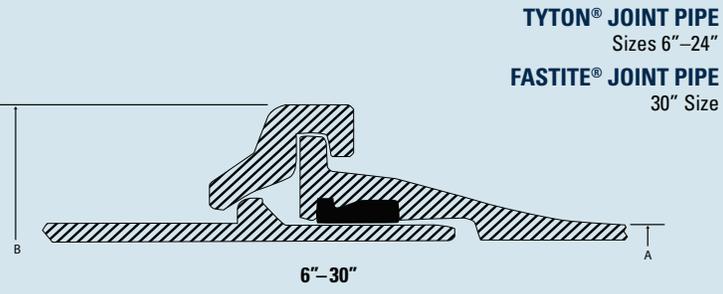
Pipe Size In.	*Pressure Rating psi	A In.	B PIPE In.	C In.	# of D.I. Locking Segments	# of Rubber Segments Retainers	Max Deflection Degrees	Pullout
4	350	4.80	7.25	4.84	2	1	3	0.05
6	350	6.90	9.52	5.27	2	1	5	0.04
8	350	9.05	11.93	5.82	2	1	5	0.04
10	350	11.10	14.37	6.03	2	1	5	0.05
12	350	13.20	16.68	6.30	4	2	3-1/4	0.05
14	350	15.30	19.16	7.75	4	2	3-1/4	0.05
16	350	17.40	21.46	7.95	4	2	3-1/4	0.05
18	350	19.50	23.76	8.19	4	2	3	0.05
20	350	21.60	26.04	8.40	4	2	2-1/2	0.05
24	350	25.80	30.61	8.86	8	4	1-1/2	0.05
30	250	32.00	36.88	10.28	8	4	1-1/2	0.05
36	250	38.30	43.85	10.87	8	4	1-1/2	0.05

NO EXCEPTION TAKEN
 REJECTED

*The TR FLEX® Restrained Joint has a working pressure rating equivalent to the working pressure rating of the parent pipe with a maximum working pressure rating of 350 psi for 4" through 24" and 250 psi for 30" through 36".

NOTE: These deflections are based on joints with nominal dimensions.

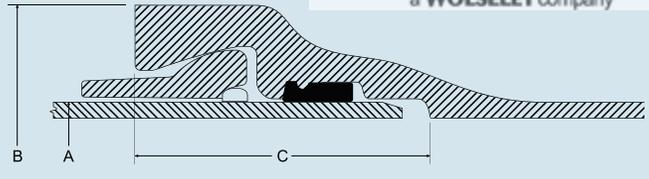
SUPER-LOCK® RESTRAINED JOINT PIPE



Pipe Size In.	*Pressure Rating psi	Deflection		A	B
		Degrees	Inches in 18ft	Pipe O.D.	Retainer O.D.
6	350	4	15	6.90	11.75
8	350	4	15	9.05	14.38
10	350	4	15	11.10	16.75
12	350	4	15	13.20	19.13
14	350	3	11	15.30	21.75
16	350	3	11	17.40	24.00
18	350	3	11	19.50	26.38
20	350	3	11	21.60	28.63
24	350	3	11	25.80	33.75
30	250	3	11	32.00	40.13

* In the 14" and larger sizes, pressure rating is limited to the rating of the pipe barrel thickness selected.
 Dimensions subject to manufacturing tolerances.

THRUST-LOCK™ BOLTLESS RESTRAINED JOINT PIPE



Thrust-LOCK™ Boltless Restrained Joint

Pipe Size In.	*Pressure Rating psi	Deflection		A	B	C
		Degrees	Inches in 18ft	Pipe O.D.	Bell O.D.	Spigot Socket
6	350	4	15	6.90	10.187	5.01
8	350	4	15	9.05	13.187	5.57
10	350	4	15	11.10	15.187	5.88
12	350	4	15	13.20	17.250	6.13
16	350	4	15	15.30	20.625	7.63
18	350	4	15	17.40	22.375	7.88
20	350	4	15	19.50	25.125	8.13
24	350	4	15	21.60	27.250	8.38
30	250	4	15	25.80	31.562	8.63
36	250	4	15	32.00	39.06	10.53

MAKE CORRECTIONS NOTED
 REVISE AND RESUBMIT
 SUBMIT SPECIFIED ITEM

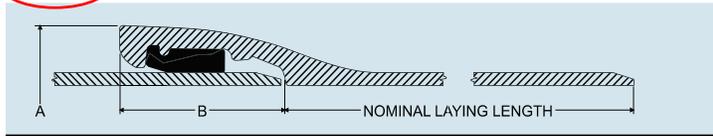
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*The THRUST-LOCK™ Restrained Joint has a working pressure rating equivalent to the working pressure rating of the parent pipe with a maximum working pressure rating of 350 psi for 6" through 24" and 250 psi for 30".
 † These deflections are based on joints with nominal dimensions.

In.	psi	Nominal Thickness In.	Laying Conditions				
			Type 1 Trench	Type 2 Trench	Type 3 Trench	Type 4 Trench	Type 5 Trench
			Maximum depth of cover †-ft				
3	350	0.25	78	88	99	100§	100§
4	350	0.25	53	61	69	85	100§
6	350	0.25	26	31	37	47	65
8	350	0.25	16	20	25	34	50
10	350	0.26	11**	15	19	28	45
12	350	0.28	10**	15	19	28	44
14	250	0.28	††	11**	15	23	36
	300	0.30	††	13	17	26	42
	350	0.31	††	14	19	27	44
16	250	0.30	††	11**	15	24	34
	300	0.32	††	13	17	26	39
	350	0.34	††	15	20	28	44
18	250	0.31	††	10**	14	22	31
	300	0.34	††	13	17	26	36
	350	0.36	††	15	19	28	41
20	250	0.33	††	10	14	22	30
	300	0.36	††	13	17	26	35
	350	0.38	††	15	19	28	38
24	200	0.33	††	8**	12	17	25
	250	0.37	††	11	15	20	29
	300	0.40	††	13	17	24	32
	350	0.43	††	15	19	28	37
30	150	0.34	††	--	9	14	22
	200	0.38	††	8**	12	16	24
	250	0.42	††	11	15	19	27
36	300	0.45	††	12	16	21	29
	350	0.49	††	15	19	25	33
	150	0.38	††	--	9	14	21
36	200	0.42	††	8**	12	15	23
	250	0.47	††	10	14	18	25
	300	0.51	††	12	16	20	28
350	0.56	††	15	19	24	32	

† An allowance for a single H-20 truck with 1.5 impact factor is included for all depths of cover.
 § Calculated maximum depth of cover exceeds 100 ft (30.5 m).
 ** Minimum allowable depth of cover is 3 ft (0.9 m).
 †† For pipe 14 in. (350 mm) and larger, consideration should be given to the use of laying conditions other than Type 1.

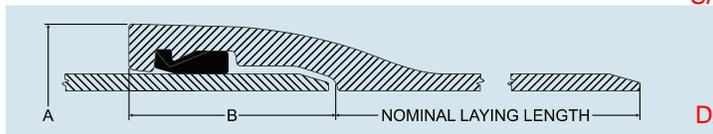
TYTON® AND FASTITE® JOINT PIPE



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.

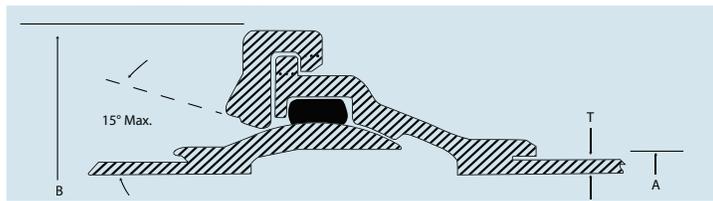


Fastite® Joint

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.

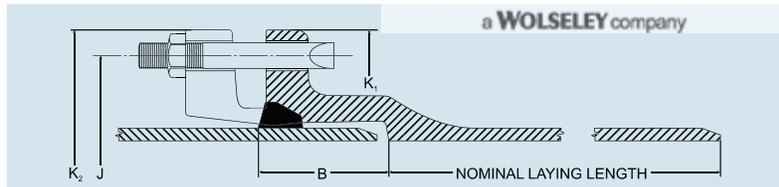
Pipe, Bell, Ball and Retainer are ductile iron.

Dimensions and weights are subject to manufacturing tolerances.

6"-24" pressure rating: 350 psi

30"-36" pressure rating: 250 psi

MECHANICAL JOINT PIPE



NO EXCEPTION TAKEN MAKE CORRECTIONS NOTED

REJECT REVISE AND RESUBMIT

SUBMIT SPECIFIED ITEM

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.	Length In.			
3	.25	.40	3.96	2.50	6.19	7.62	7.85	4	3/8	3	11	7
4	.25	.41	4.80	3.50	7.50	9.06	9.12	4	3/4	3-1/2	16	10
6	.25	.43	6.90	4.50	8.50	10.61	10.72	4	3/4	3-1/2	18	16
8	.25	.45	9.05	5.50	9.50	11.06	11.12	4	3/4	3-1/2	24	25
10	.26	.47	11.10	6.50	10.50	12.31	12.37	4	3/4	3-1/2	31	30
12	.28	.49	13.20	7.50	11.50	13.56	13.62	4	3/4	3-1/2	37	40
14	.28	.51	15.30	8.50	12.50	14.81	14.87	4	3/4	3-1/2	44	45
16	.30	.52	17.40	9.50	13.50	16.06	16.12	4	3/4	3-1/2	51	55
18	.31	.53	19.50	10.50	14.50	17.31	17.37	4	3/4	3-1/2	61	65
20	.33	.54	21.60	11.50	15.50	18.56	18.62	4	3/4	3-1/2	74	85
24	.33	.56	25.80	13.20	17.20	20.25	20.25	4	3/4	4-1/2	98	105
30	.34	.63	32.00	15.00	19.00	22.00	22.00	4	3/4	4-1/2	123	105
36	.38	.73	38.30	17.00	21.00	24.00	24.00	5	3/4	5	123	105

DATE 3/27/2015 By James Rashford

** 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
14	250	0.28	15.30	40.40	45.00	770	42.90
	300	0.30	15.30	43.30	45.00	825	45.80
	350	0.31	15.30	44.70	45.00	850	47.20
16	250	0.30	17.40	49.30	54.00	940	52.30
	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
	350	0.43	25.80	104.90	95.00	1985	110.20
30**	150	0.34	32.00	103.50	139.00	2000	111.20
	200	0.38	32.00	115.50	139.00	2220	123.20
	250	0.42	32.00	127.50	139.00	2435	135.20
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
36**	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

Type 1*
Flat-bottom trench. † Loose backfill.

Type 2
Flat-bottom trench. † Backfill lightly consolidated to centerline of pipe.

Type 3
Pipe bedded in 4 in. (100 mm) minimum of loose soil. ++ Backfill lightly consolidated to top of pipe.

Type 4
Pipe bedded in sand, gravel, or crushed stone to depth of 1/8 pipe diameter, 4 in. (100 mm) minimum. Backfill compacted to top of pipe. (Approximately 80 percent Standard Proctor, AASHTO T-99.)

Type 5
Pipe bedded in compacted granular material to centerline of pipe. Compacted granular or select material ++ to top of pipe. (Approximately 90 percent Standard Proctor, AASHTO T-99.)

* For 14 in. (355-mm) and larger pipe, consideration should be given to the use of laying conditions other than Type 1.

† "Flat-bottom" is defined as undisturbed earth.

++ "Loose soil" or "select material" is defined as native soil excavated from the trench, free of rocks, foreign materials, and frozen earth.

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	
Asphalitic	ANSI/AWWA C151/A21.51 ANSI/AWWA C110/A21.10 ANSI/AWWA C153/A21.53 ANSI/AWWA C104/A21.4
Cement Lining	MANUFACTURER'S STANDARD
Various Epoxy Linings and Coatings	
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 WATERWORKS PUSH-ON JOINT AND MECHANICAL JOINT DUCTILE IRON PIPE

a WOLSELEY company

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	12.80	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	26.00	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	51.30	59	990	55.00
14	52	.39	15.30	55.90	59	1065	59.20
14	53	.42	15.30	60.00	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	1430	79.30
18	53	.44	19.50	80.60	74	1525	84.70
18	54	.47	19.50	86.00	74	1620	90.10
18	55	.50	19.50	91.30	74	1715	95.40
18	56	.53	19.50	96.70	74	1815	100.80
20	50	.36	21.60	73.50	80	1405	77.90
20	51	.39	21.60	79.50	80	1510	83.90
20	52	.42	21.60	85.50	80	1620	89.90
20	53	.45	21.60	91.50	80	1735	95.90
20	54	.48	21.60	97.50	80	1850	101.90
20	55	.51	21.60	103.40	80	1940	107.80
20	56	.54	21.60	109.30	80	2045	113.70
24	50	.38	25.80	92.90	101	1775	98.50
24	51	.41	25.80	100.10	101	1905	105.70
24	52	.44	25.80	107.30	101	2030	112.90
24	53	.47	25.80	114.40	101	2160	120.00
24	54	.50	25.80	121.60	101	2290	127.20
24	55	.53	25.80	128.80	101	2420	134.40
24	56	.56	25.80	135.90	101	2545	141.50
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

NO EXCEPTION TAKEN
REJECTED
SUBMIT SPECIFIED ITEM
CHECKING IS ONLY FOR THE GENERAL CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND GENERAL COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. ANY ACTION SHOWN IS SUBJECT TO THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS. CONTRACTOR IS RESPONSIBLE FOR DIMENSIONS WHICH SHALL BE CONFIRMED AND CORRELATED AT THE JOB SITE BY QUALIFIED PROFESSIONALS AND TECHNIQUES OF CONSTRUCTION. COORDINATION OF HIS WORK WITH THAT OF ALL OTHER UTILITIES AND THE SATISFACTORY PERFORMANCE OF THE WORK.

CHA

DATE 3/27/2015 By James Radford

ATLANTIC STATES CAST IRON PIPE CO.
183 Sitgreaves St.
Phillipsburg, NJ 08865
908-454-1161
atlanticstates.com

CLOW WATER SYSTEMS COMPANY
2266 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
11757 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, valves, 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.

- NO EXCEPTION TAKEN MAKE CORRECTIONS NOTED
 REJECTED REVISE AND RESUBMIT
- 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.

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- 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 connect pipe sections through the pipe joint, as they could be damaged and fail.
- Do not use SURE STOP 350® GASKETS in 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.

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.

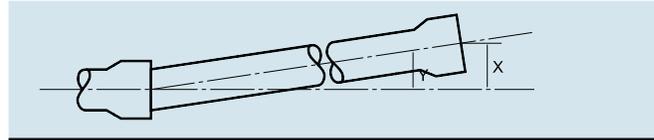


Figure 1

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.



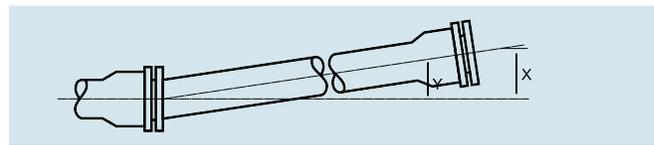
JOINT DEFLECTION CHART



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

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.

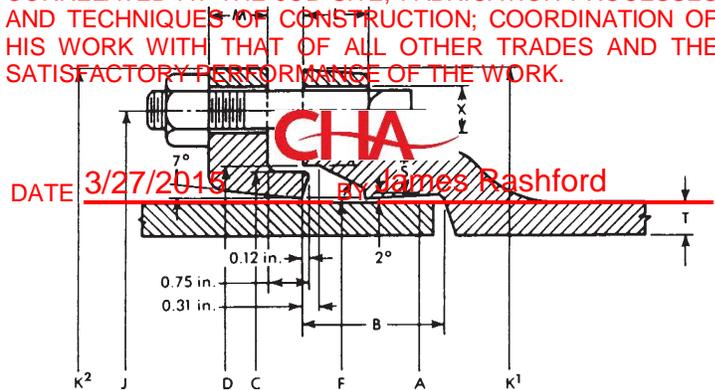
Tyler/Union

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

NO EXCEPTION TAKEN MAKE CORRECTIONS NOTED
 REJECTED REVISE AND RESUBMIT
 SUBMIT SPECIFIED ITEM

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JOINT DIMENSIONS IN INCHES

BOLTS

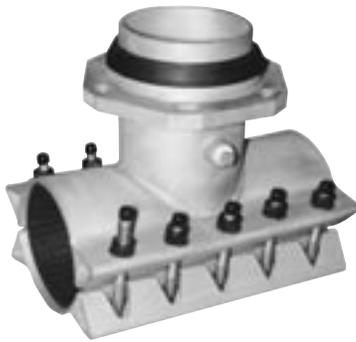
Size	A Dia.	B	C Dia.	D Dia.	F Dia.	Ø	J Dia.	K' Dia.	K² Dia.	L	M	S	T	X Dia.	Size	No.
3	3.96	2.50	4.84	4.94	4.06	28°	6.19	7.62	7.69	.58	.62	.39	.33	3/4	5/8x3	4
4	4.80	2.50	5.92	6.02	4.90	28°	7.50	9.06	9.12	.60	.75	.39	.34	7/8	3/4x3 1/2	4
6	6.90	2.50	8.02	8.12	7.00	28°	9.50	11.06	11.12	.63	.88	.43	.36	7/8	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



Tyler Pipe/Utilities Division • P.O. Box 2027 • Tyler, Texas 75710 • (903) 882-5511

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

MULTIPLIER



MODEL 3490MJ FABRICATED STAINLESS STEEL

MJ OUTLET: Type 304 (18-8) Stainless Steel per ANSI 21.11.

FABRICATIONS: Type 304 (18-8) Stainless Steel per ASTM A240.

SHELL GASKET: 1/4" thick Nitrile (Buna-N, NBR) Chek-O-Seal with multi o-ring sealing ribs from 100% new rubber to ensure performance under varying pressures with superior storage characteristics. Suitable for oils, acids, alkalis, most Hydrocarbon Fluids (aliphatic), potable water and many chemicals within a temperature range of -40° F to +212° F. SBR may be substituted.

BRANCH GASKET: Hydro TwinSeal® dual o-ring design incorporating both hydrostatic and mechanical forces to affect a dynamic seal.

BOLTS & NUTS: Type 304 (18-8) Stainless Steel per ASTM A193 and A194. NOTE: Stainless Steel hex nuts are furnished with fusion bonded coating to prevent seizing and galling.

Pipe Size		Pipe OD Range		By	Branch Size		Stainless Steel Flange	Weight		Bolt Qty.	
in.	mm.	in.	mm.		in.	mm.		lbs	kgs.		
4	100	A	4.50-4.70	114-119	X	2	50	\$727.20	24	11	8
		B	4.70-4.90	119-124							
		C	4.80-5.00	122-127							
		D	5.10-5.30	130-135							
		E	5.20-5.40	132-137							
		F	4.50-4.70	114-119	X	4	100	\$754.60	42	19	10
		G	4.70-4.90	119-124							
		H	4.80-5.00	122-127							
		I	5.10-5.30	130-135							
		J	5.20-5.40	132-137							
6	150	A	6.00-6.20	152-157	X	2	50	\$754.60	43	20	8
		B	6.60-7.00	168-178		3		\$754.60			
		C	6.90-7.30	175-185		4		\$754.60			
		D	7.10-7.50	180-191							
		E	6.60-6.70	168-170	X	6	150	\$805.50	51	23	10
		F	6.80-7.00	173-178							
		G	6.90-7.10	175-180							
		H	7.10-7.30	180-185							
		I	7.30-7.50	185-191							
8	200	A	7.90-8.30	201-211	X	2	50	\$780.50	46	21	8
		B	8.60-9.05	218-230		3		\$780.50			
		C	9.05-9.45	230-240		4		\$780.50			
		D	9.20-9.60	234-244		6		\$844.70			
		E	8.60-9.05	218-230	X	8	200	\$1,035.70	80	36	16
		F	9.05-9.45	230-240							
		G	9.20-9.60	234-244							
10	250	A	9.90-10.30	251-262	X	2	50	\$900.50	48	22	8
		B	10.70-11.10	272-282		3		\$900.50			
		C	11.40-11.80	290-300		4		\$900.50			
		D	11.40-11.80	290-300		6		\$974.30			
		E	10.70-11.10	272-282	X	10	250	\$1,742.50	126	57	20
		F	11.10-11.50	282-290							
		G	11.40-11.80	290-300							
		H	11.40-11.80	290-300							
		I	11.40-11.80	290-300							

NO EXCEPTION TAKEN MAKE CORRECTIONS NOTED

REJECTED REVISE AND RESUBMIT

SUBMIT SPECIFIC ITEM

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DATE 3/27/2015 BY James Rashford

HOW TO ORDER: Choose the Pipe Size Letter Code corresponding to a Pipe OD Range that covers the Pipe OD to be tapped and then specify the desired branch size. EXAMPLE: 16" Asbestos-Cement Class 150 O.D. 18.72 with 8 inch Branch. Order 3490MJ-18B x 8. NOTE: 30", 36", 42", and 48" nominal size sleeves available with outlet sizes 2" through 24".

*Manufactured under U.S. Patents 5,040,828 and 6,227,234

TAPPING SLEEVES



MULTIPLIER

MODEL 3490MJ FABRICATED STAINLESS STEEL

Pipe Size		Pipe OD Range		By	Branch Size		Stainless Steel Flange	Weight		Bolt Qty.	
in.	mm.	in.	mm.		in.	mm.		lbs.	kgs.		
12	300	A	11.90-12.30	302-312	X	2	50	\$1,006.90	49	22	8
		B	12.50-12.90	318-328		3	80	\$1,006.90	55	25	8
		C	13.20-13.60	335-345		4	100	\$1,006.90	61	27	10
		D	13.40-13.80	340-351		6	150	\$1,114.80	66	30	10
		E	13.90-14.30	355-363		8	200	\$1,399.90	91	41	16
						10	250	\$1,780.80	140	64	20
		F	12.50-12.90	318-328	X	12	300	\$1,973.20	162	73	20
		G	13.20-13.60	335-345							
		H	13.40-13.80	340-351							
		I	13.90-14.30	353-365							
14	350	A	15.00-15.40	381-391	X	2	50	\$1,188.50	75	34	8
		B	15.30-15.70	389-399		3	80	\$1,188.50	79	36	8
		C	15.90-16.30	404-414		4	100	\$1,188.50	82	37	10
		D	16.40-16.80	417-427		6	150	\$1,296.30	86	39	10
						8	200	\$1,558.30	116	53	16
				10	250	\$1,975.90	151	68	20		
				12	300	\$2,218.70	173	78	20		
16	400	A	17.00-17.40	432-442	X	2	50	\$1,424.60	85	39	8
		B	17.40-17.80	442-452		3	80	\$1,424.60	89	40	8
		C	17.70-18.10	450-460		4	100	\$1,424.60	92	42	10
						6	150	\$1,614.30	95	43	10
						8	200	\$1,754.80	128	58	16
					10	250	\$2,196.90	164	74	20	
					12	300	\$2,405.70	184	83	20	
		D	17.40-17.80	442-452	X	16	400	\$6,709.40	347	157	24
		E	17.70-18.10	450-460							
18	450	A	18.40-18.80	467-478	X	2	50	\$1,424.60	85	39	8
		B	18.60-19.00	472-483		3	80	\$1,424.60	89	40	8
		C	19.30-19.70	490-500		4	100	\$1,424.60	92	42	10
		D	19.80-20.20	503-513		6	150	\$1,614.30	95	43	10
						8	200	\$1,872.20	128	58	16
						10	250	\$2,702.70	164	74	20
						12	300	\$2,957.30	184	83	20
						16	400	\$7,292.70	347	157	24
						18	450	POA			
20	500	<input checked="" type="checkbox"/> NO EXCEPTION TAKEN <input type="checkbox"/> REJECTED <input type="checkbox"/> SUBMIT SPECIFIED ITEM CHECKING IS ONLY FOR THE GENERAL CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND GENERAL COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. ANY ACTION SHOWN IS SUBJECT TO THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS. CONTRACTOR IS RESPONSIBLE FOR DIMENSIONS WHICH SHALL BE CONFIRMED AND CORRELATED AT THE JOB SITE; FABRICATION PROCESSES AND TECHNIQUES OF CONSTRUCTION; COORDINATION OF THIS WORK WITH ALL OTHER TRADES AND THE SATISFACTORY PERFORMANCE OF THE WORK.		<input type="checkbox"/> MAKE CORRECTIONS NOTED <input type="checkbox"/> REVISE AND RESUBMIT	2	50	\$1,503.70	176	80	8	
					3	80	\$1,503.70	176	80	8	
					4	100	\$1,503.70	176	80	10	
					6	150	\$1,615.60	182	83	10	
					8	200	\$1,892.60	213	97	16	
					10	250	\$3,058.30	248	112	20	
					12	300	\$3,445.60	268	122	20	
					16	400	\$7,926.90	357	162	24	
					18	450	POA			28	
					20	500	POA			30	
24	600	<input checked="" type="checkbox"/> NO EXCEPTION TAKEN <input type="checkbox"/> REJECTED <input type="checkbox"/> SUBMIT SPECIFIED ITEM CHECKING IS ONLY FOR THE GENERAL CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND GENERAL COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. ANY ACTION SHOWN IS SUBJECT TO THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS. CONTRACTOR IS RESPONSIBLE FOR DIMENSIONS WHICH SHALL BE CONFIRMED AND CORRELATED AT THE JOB SITE; FABRICATION PROCESSES AND TECHNIQUES OF CONSTRUCTION; COORDINATION OF THIS WORK WITH ALL OTHER TRADES AND THE SATISFACTORY PERFORMANCE OF THE WORK.		<input type="checkbox"/> MAKE CORRECTIONS NOTED <input type="checkbox"/> REVISE AND RESUBMIT	2	50	\$1,580.20	176	80	8	
					3	80	\$1,580.20	176	80	8	
					4	100	\$1,580.20	176	80	10	
					6	150	\$1,727.50	182	83	10	
					8	200	\$2,064.60	213	97	16	
					10	250	\$3,159.10	248	112	20	
					12	300	\$3,548.90	268	122	20	
					16	400	\$8,616.20	357	162	24	
					18	450	POA			28	
					20	500	POA			30	
24	600	POA			30						



DATE 3/27/2015 BY James Rashford

CUSTOM DESIGNS AND SIZES AVAILABLE.

HOW TO ORDER: Choose the Pipe Size Letter Code corresponding to a Pipe OD Range that covers the Pipe OD to be tapped and then specify the desired branch size.
 EXAMPLE: 16" Asbestos-Cement Class 150 O.D. 18.72 with 8 inch Branch. Order 3490MJ -18B x 8.

*Manufactured under U.S. Patents 5,040,828 and 6,227,234

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

NO EXCEPTION TAKEN MAKE CORRECTIONS NOTED
 REJECTED REVISE AND RESUBMIT

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.



SUBMIT SPECIFIED ITEM
3" THROUGH 36" SIZES - 100% DUCTILE IRON CONSTRUCTION

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DATE 3/27/2015

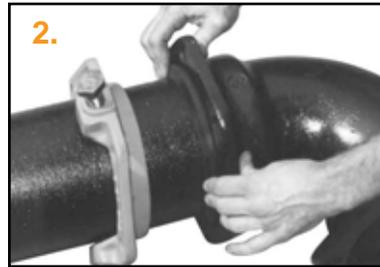
BY James Rashford

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

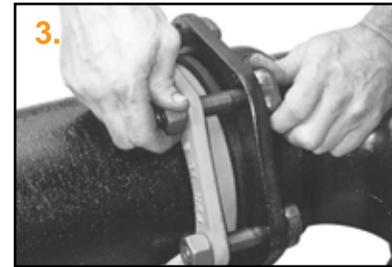
Uni-Flange® Series 1400 Installation Instructions



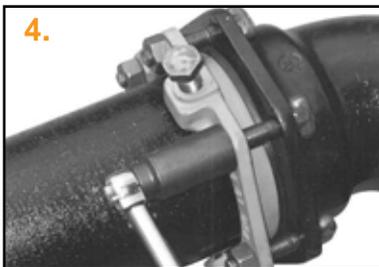
1. Clean the socket and plain end. Lubricate gasket and plain end with approved pipe lubricant meeting AWWA C111. Place the gland on the plain end with the lip extension toward the plain end, followed by the gasket with the tapered edge of the gasket toward the plain end.



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 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 "hand tight."



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: The Series 1400 can be re-used or re-installed after the Auto-Tork screw heads have been twisted off. In this case, tighten the hex head of the wedge activating screw to 75 - 110 ft-lb.

Uni-Flange® Series 1400

Information - Wedge Action MJ Retainer Gland for Ductile Iron Pipe

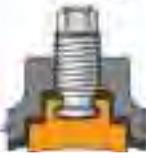
HISTORY

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.

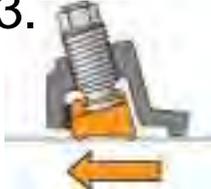
HOW IT WORKS

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.

1.  “Auto-Tork” wedge actuating screw with break-away heads that twist off at the recommended torque.

 Wedges are contoured to fit the pipe and are mechanically retained in pockets.

2.  Wedge is positioned at the front of the pocket during normal operating pressures.

3.  Pressure surges cause the wedge to move back in its pocket, increasing its grip on the pipe.

NO EXCEPTION TAKEN MAKE CORRECTIONS NOTED
 REJECTED REVISE AND RESUBMIT
 SUBMIT SPECIFIED ITEM

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 C11. 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.

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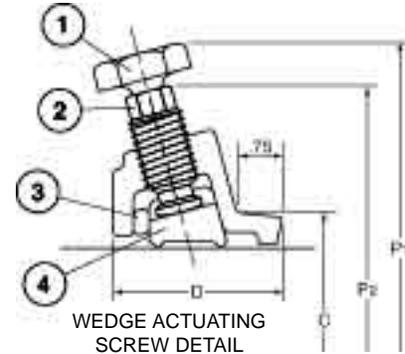
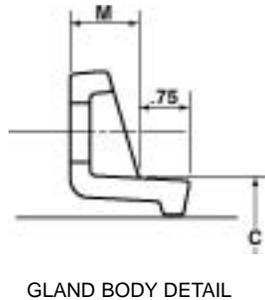
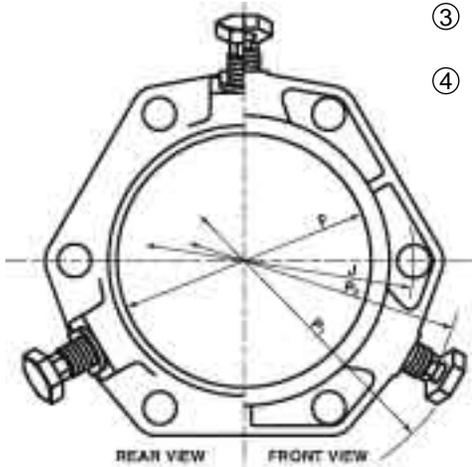
DATE 3/27/2015 BY James Rashford



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-(I or U)	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-(I or U)	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-(I or U)	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-(I or U)	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-(I or U)	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-(I or U)	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-(I or U)	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-(I or U)	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-(I or U)	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-(I or U)	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-(I or U)	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-(I or U)	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-(I or U)	250	24	256.0	46.9	44.9	39.59	3.75	38.47	2.25	43.75	24

NO EXCEPTION TAKEN MAKE CORRECTIONS NOTED
 REJECTED REVISE AND RESUBMIT
 SUBMIT SPECIFIED ITEM

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 applications (Soft Clay) and 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.

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DATE 3/27/2015 BY James Rashford

Uni-Flange® Series 1400

Wedge Action MJ Retainer Gland Joint Restraint for Ductile Iron Pipe

SERIES 1400 WEDGE ACTION RETAINER GLAND PACKAGED WITH ACCESSORIES



PACKAGE CONTAINS

- 1 - Series 1400 Wedge Action retainer gland.
- 1 - Set of high strength, low alloy T-bolts & nuts (AWWA C111).
- 1 - Mechanical joint gasket (AWWA C111) 3" - 24" sizes, Uni-Seal Gasket 30" - 36" sizes.

3" through 12" sizes are shrink wrapped in a weather resistant carton. 14" through 36" sizes are bulk packaged.

Series 1400-DA Wedge Action Retainer Gland for Ductile Iron Pipe

NOM. PIPE SIZE	PIPE O.D. (INCHES)	CATALOG NUMBER	NO. OF WEDGES	PRESSURE RATING (PSI)	APPROX. WEIGHT (LBS.)
3"	3.96	UFR1400-DA-3-(I or U)	2	350	8.0
4"	4.80	UFR1400-DA-4-(I or U)	2	350	10.5
6"	6.90	UFR1400-DA-6-(I or U)	3	350	15.5
8"	9.05	UFR1400-DA-8-(I or U)	4	350	19.8
10"	11.10	UFR1400-DA-10-(I or U)	6	350	29.5
12"	13.20	UFR1400-DA-12-(I or U)	8	350	35.0
14"	15.30	UFR1400-DA-14-(I or U)	10	350	52.0
16"	17.40	UFR1400-DA-16-(I or U)	12	350	62.0
18"	19.50	UFR1400-DA-18-(I or U)	12	250	79.0
20"	21.60	UFR1400-DA-20-(I or U)	14	250	88.0
24"	25.80	UFR1400-DA-24-(I or U)	16	250	101.0
30"	32.00	UFR1400-DA-30-(I or U)	20	250	262.0
36"	38.30	UFR1400-DA-36-(I or U)	24	250	306.0

30" and 36" sizes include a Uni-Seal Gasket.

I = Import Casting U = Domestic Casting

Note: Not to be used on plain end fittings.

NO EXCEPTION TAKEN

MAKE CORRECTIONS NOTED

CASTING

REVISE AND RESUBMIT

SUBMIT SPECIFIED ITEM

Sample Specification - Series 1400

Restraint for standardized mechanical joints shall be incorporated into the design of the retainer gland and shall include multiple points of wedge action against the pipe, increasing its resistance to the pressure ratings of the pipe and joint shall maintain its flexibility after burial and shall maintain its flexibility by a controlled and limited expansion of each joint during the wedging action. Restraining glands shall be manufactured of high strength ductile iron conforming to the requirements of ASTM A536, Grade 65-45-12. Wedges shall be manufactured of high strength ductile iron conforming to the requirements of ASTM A536, Grade 65-45-12. Dimensions of the glands shall be such that they can be used with the standardized mechanical joint bearing heads conforming to the requirements of ANSI/AWWA C111/A21.11 and ANSI/AWWA C153/A21.53 of latest revision. Twist-off heads shall be incorporated in the design of the wedge actuating screws to ensure proper torque. The mechanical joint restraint shall have a water working pressure rating of 250 psi minimum with a safety factor of at least 2:1 against separation when tested in a dead-end situation, and shall be Uni-Flange® Series 1400 or approved equal.

DATE 3/27/2015 BY James Rashford

NUT, BOLT, GASKET KITS*

Features:

Non-Asbestos Gaskets

- Material: ASTM F104
- Line Call Out: F712120A9B4E22K5M5
- Color: Green
- Thickness: 1/16"
- Min. / Max. Temperature: -45°F / 500°F
- Max. Operating Temperature: 350°F Continuous
- Max. Operating Pressure: 1000 PSI
- Maximum P_{xT} (PSIG x °F): 350,000
- Creep Relaxation: 30% (ASTM F38)
- Recovery: 40% (ASTM F36)

Red Rubber Gaskets

- Material: Red Rubber
- Color: Red / Reddish Orange
- Thickness: 1/16"
- Min. Temperature: -20°F
- Hardness: 80 Shore A (ASTM D2240)
- Tensile: 500 PSI (ASTM D412)
- Elongation: 250% (ASTM D412)
- Compression Set: 22 Hrs @ 158°F, 55% (ASTM D395B)
- Heat Aging: 70 Hrs @ 158°F (ASTM D573)
- Changed Hardness: 4 Points
- Changed Tensile: -14%
- Changed Elongation: -76%

Bolts

- Material: Carbon Steel ASTM A307 Grade A
- Coating: Zinc Plated
- Sizing: ANSI B18.2.1
- Tensile: 60,000 PSI Minimum
- Elongation: 18% Minimum
- Rockwell Hardness: 69-100R_s



Nuts

- Material: Carbon Steel SAE J995 Grade 2
- Coating: Zinc Plated
- Sizing: ANSI B18.2.2

Size Ranges

Non-Asbestos Kits

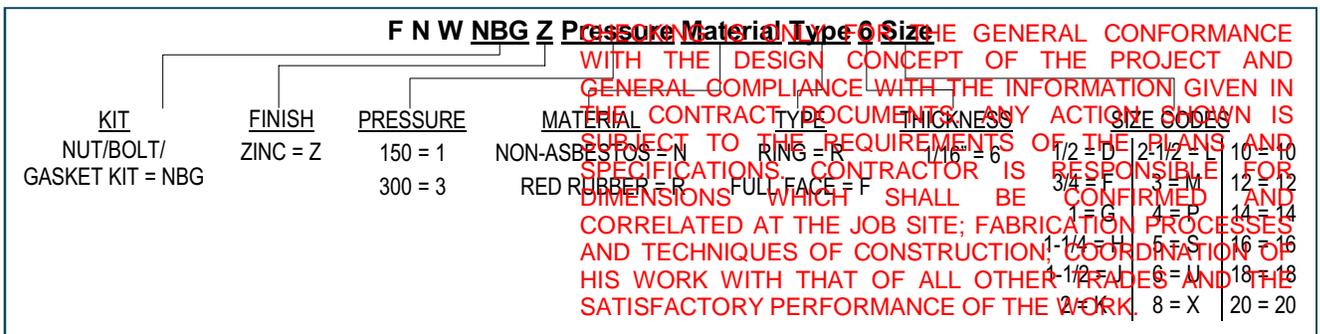
- 150# Ring Gaskets - 1/2" to 20"
- 300# Ring Gaskets - 1/2" to 20"

Red Rubber Kits

- 150# Ring Gaskets - 2" to 12"
- 150# Full Face Gaskets - 2" to 16"

- NO EXCEPTION TAKEN
- MAKE CORRECTIONS NOTED
- REJECTED
- REVISE AND RESUBMIT

Figure Number Matrix SUBMIT SPECIFIED ITEM



Note: Physical properties are nominal values obtained from laboratory test samples. Actual product may vary. Please ensure the product meets your application specification prior to order placement.

* Each kit contains components for one flange.

** Note: Not all combinations in the matrix are available. Consult your supplier on specific material, rating, and size combinations.

DATE 3/27/2015 BY James Rashford

LUGGED BUTTERFLY VALVE BOLT PACKS*

Features:

- Material: Carbon Steel ASTM A307 Grade A
- Coating: Zinc Plated
- Sizing: ANSI B18.2.1
- Tensile: 60,000 PSI Minimum
- Elongation: 18% Minimum
- Rockwell Hardness: 69-100R_b
- Sizes: 2" to 12" (150# Flanges Only)



* Each kit contains components for two flanges.

- NO EXCEPTION TAKEN MAKE CORRECTIONS NOTED
 REJECTED REVISE AND RESUBMIT
 SUBMIT SPECIFIED ITEM

Figure Number Matrix

F N W LBB Z Size

KIT	FINISH	SIZE CODES		
BOLT KIT = LBB	ZINC = Z	2 = K	4 = P	8 = X
		2-1/2 = L	5 = S	10 = 10
		3 = M	6 = U	12 = 12

CHECKING IS ONLY FOR THE GENERAL CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND GENERAL COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. ANY ACTION SHOWN IS SUBJECT TO THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS. CONTRACTOR IS RESPONSIBLE FOR DIMENSIONS WHICH SHALL BE CONFIRMED AND CORRELATED AT THE JOB SITE; FABRICATION PROCESSES AND TECHNIQUES OF CONSTRUCTION; COORDINATION OF HIS WORK WITH THAT OF ALL OTHER TRADES AND THE SATISFACTORY PERFORMANCE OF THE WORK.

BOLT INSULATORS

Features:

- Material: Mineral Reinforced Nylon 66 Resin, Minlon® 10B40 NC010
- Color: White
- Tensile: 13,053 PSI (A)
- Elongation: 25% (ASTM D638)
- Heat Deflection Temperature: 66 PSI - 482°F (ASTM D648) 264 PSI - 428°F (ASTM D648)
- Melting Point: 504°F (ASTM D3418)
- Specific Gravity: 1.51 (ASTM D792)
- Sold Individually *
- Sizes: 1/2", 5/8", and 3/4"

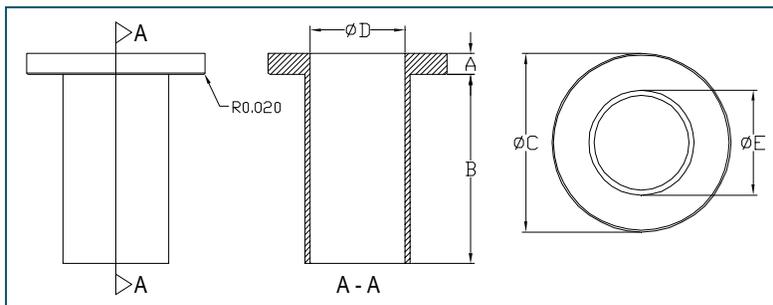


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Dimensions (Inches)

Size	A	B	ØC	ØD	ØE
1/2	0.160	1.030	1.140	0.530	0.595
5/8	0.170	1.133	1.325	0.657	0.725
3/4	0.160	1.595	1.570	0.777	0.840



Minlon® is a DuPont registered trademark

* Sold individually but packaged 200 pieces per bag, 1000 pieces per carton.

Figure Number Matrix

F N W CBI Size

KIT	SIZE CODES
BOLT INSULATOR = CBI	1/2 = D
	5/8 = E
	3/4 = F

DOC: FNWNBG08 Ver. 1/09

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MECHANICAL JOINT BOLT & GASKET PACKS

Product Features

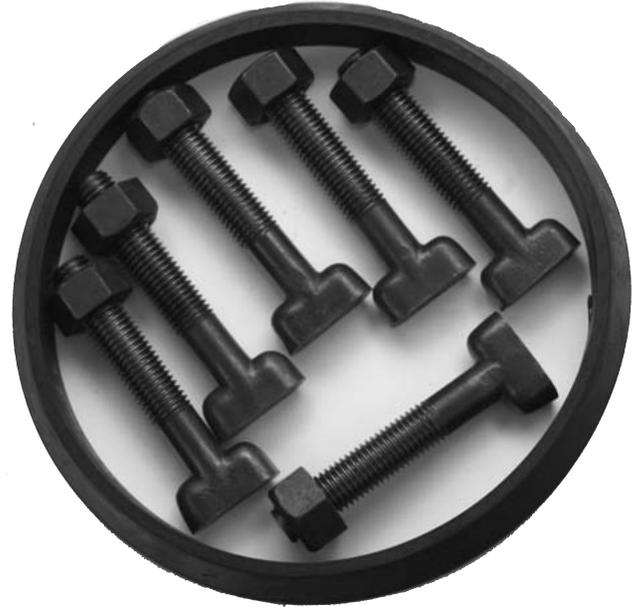
Gaskets: SBR in accordance with ANSI/AWWA
C111/A21.11

T-Bolts/Nuts: Low alloy steel in accordance with
ANSI/AWWA C111/A21.11

IMJBGPX

- NO EXCEPTION TAKEN MAKE CORRECTIONS NOTED
 REJECTED REVISE AND RESUBMIT
 SUBMIT SPECIFIED ITEM

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Model Numbers

- IMJBGPM
- IMJBGPP
- IMJBGPU
- IMJBGPX
- IMJBGPI0
- IMJBGPI2
- IMJBGPI4
- IMJBGPI6
- IMJBGPI8
- IMJBGPI20