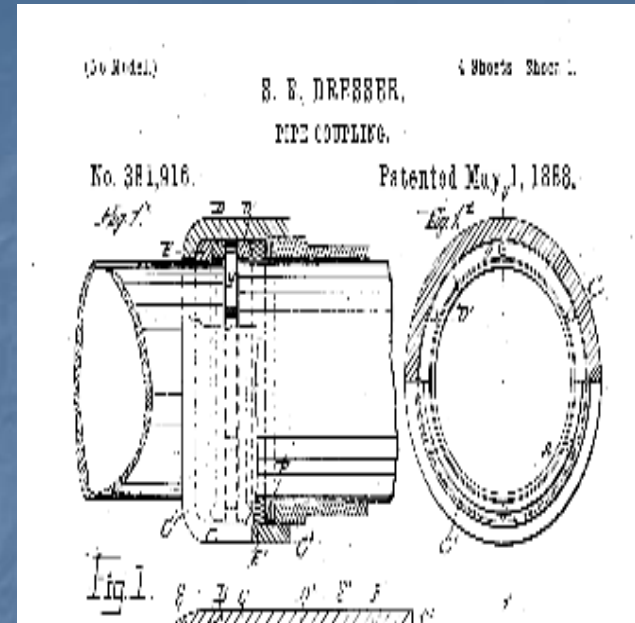


# **GENERAL INTRODUCTION TO BREAKS, SPLITS, LEAKS, BELL JOINT REPAIR AND TAPPING**

**April 2018**

**By Trent Hertzfeld  
Utility Solutions, Inc.**

# The really old way of doing things.



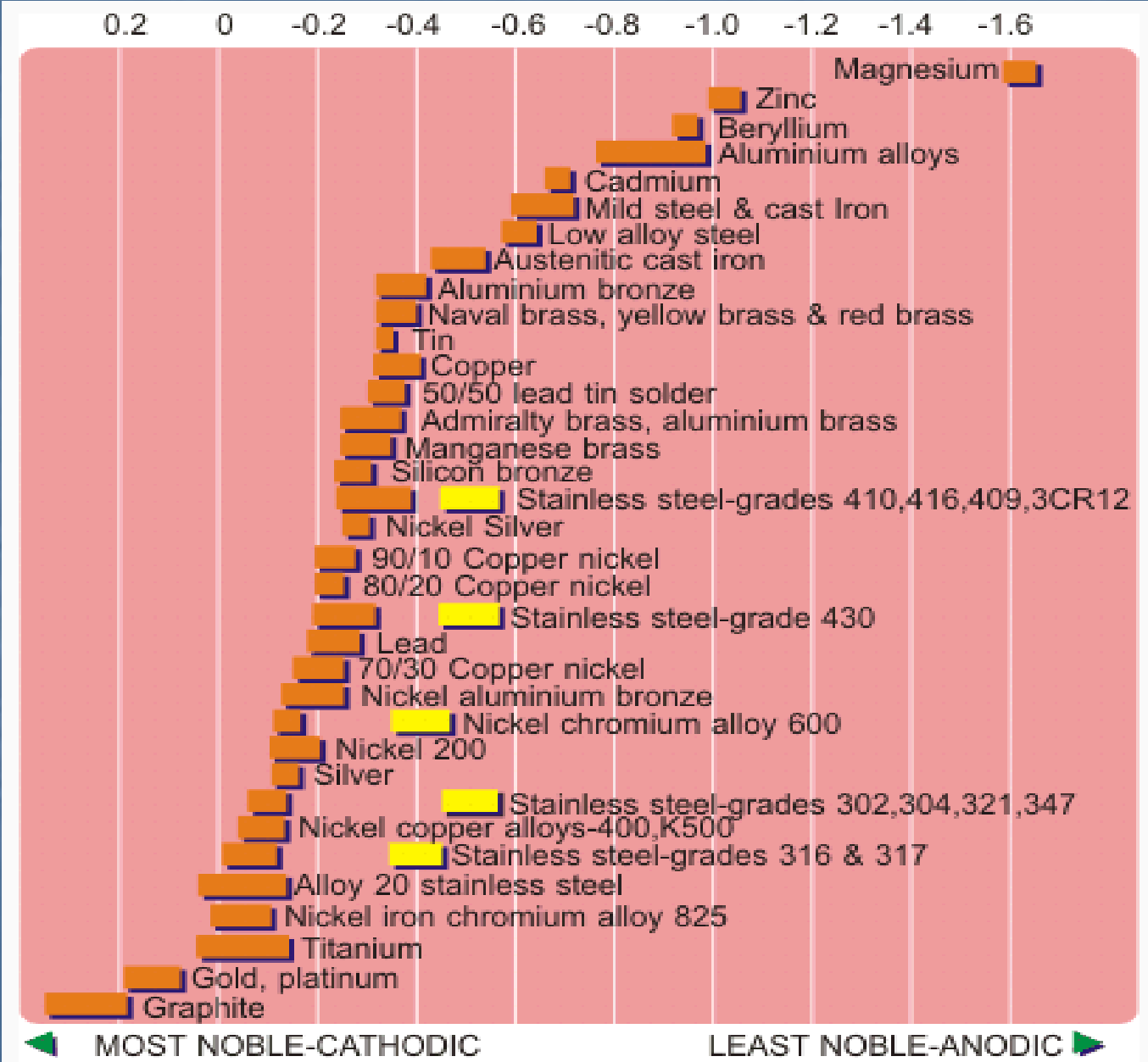
# Water Main Integrity and Corrosion



- Protect the Main from Future Damage with Proper Materials Selection



# Galvanic Series



Anodic Materials

Cathodic Materials

← MOST NOBLE-CATHODIC                      LEAST NOBLE-ANODIC →



# Minimizing Galvanic Corrosion

- **Select metals that are as close together as possible in the galvanic series.**
- **Avoid combinations of metals for which the area of the less noble metal is small in comparison to the more noble metal.**
- **Insulate dissimilar metals, make the resistance of the electrical path connecting the two metals as high as possible.**



Poor Passivation  
of the Welded  
Surfaces

Poor Passivation at the Welds and  
Too Many Welded Components



# Types of Repair Products

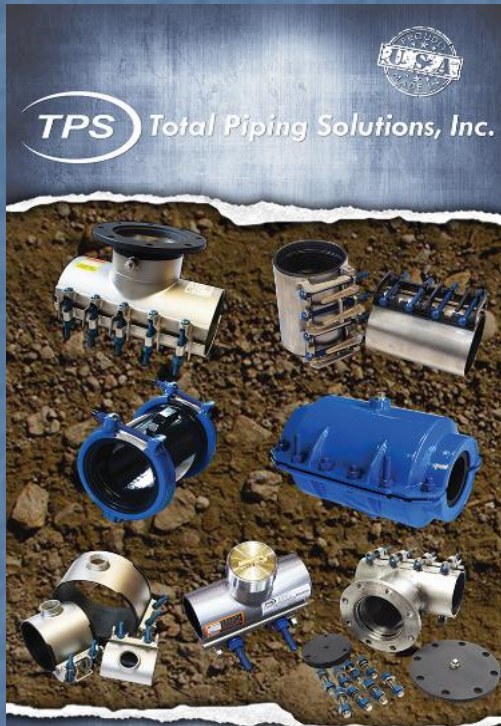


- Couplings
- Clamps
- Bell Joint Encapsulation





For All Repairs, Follow the Manufactures Directions and Guidelines Per AWWA C 219-11, AWWA C 230-06, and AWWA C 223-07



## TOTAL PIPING SOLUTIONS ADVANTAGE

Triple Tap® Tapping Sleeves and Line Stop Fittings  
Quick Cam® Rapid Seal Repair Clamp  
TX3® Wide Range Coupling  
Quick Sleeve® Bell Joint Encapsulation Sleeve  
T3® Service Saddle  
Quick Cam® Tap Saddle and Line Stop

Contact us for complete information.  
Email [sales@tps.us](mailto:sales@tps.us) or phone 716-372-0160.



- Identify Leak Location
- Dig
- Decide on the Repair
- Reduce Pressure
- Wrap it for Repair
- Cut and Couple it for Replacement
- Encapsulate It

# Water Main Breaks

- 850 a Day in North America
- 310,000/year
- Cost \$3 Billion annual
- Repair Cost Range from \$5000 to \$9000
- Cost to Replace = \$1,500,000/mile
- Cheaper to Repair





# A Typical Repair Cost Structure

- **\$5000 Backhoe and pavement**
- **\$1,100 Labor including equipment**
- **Product = \$600**
- **Total Average Cost=\$6,700**
- **The Cost of the Repair Product is 2%- 10% of the total repair cost**
- **Product Cost is Negligible**





# What is the Best Method of Repair?

**Good – Clamp  
(temporary)**

**Better –  
Encapsulate**

**Best - Cut and  
Couple**



# Bolted Compression Couplings

## AWWA C-219-17

- **Types of Couplings**
- **Dedicated Range**
- **Limited Range**
- **Wide Range**





# AWWA Standards Define Minimum Criteria for Performance, Material Selection, Fabrication, Testing and Design





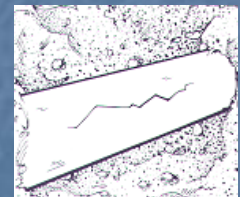
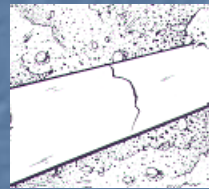
# AWWA Bolted, Sleeve—Type Couplings for Plain-End Pipe Standard – C219-17

- Carbon Steel or Cast Iron Repair Couplings for Plain End Pipe
- Supported by Total Piping Solutions, Inc., Romac, Smith Blair, JCM, Ford Meter Box, Mueller, and Cascade
- Updated every 5 years
- This Standard has been in effect since 1991



# AWWA C 219 – Bolted Couplings

- Economical means of joining plain end pipe
- 1/2 inch to 144 inches in diameter
- Types: Reducers, transitions, straight sleeves or flanged adapters.
- Applied use is the sole responsibility of the end user.





# Key Definitions in C 219-17

- **O.D. - Outside Pipe Diameter**
- **Rated Pressure**
- **Test Pressure = Hydrostatic Proof of Design**
- **Transient Pressure (water hammer)**
- **Types**
  - **Straight Coupling**
  - **Transition Coupling**
  - **Reducing Coupling**
  - **Flanged Adapter**



# Coupling Materials

- **Must Meet All Applicable Safe Drinking Water Requirements**
- **NSF-61**
- **Center Sleeves May be made of Cast Iron, Ductile Iron, Carbon Steel**
- **Gaskets Shore of 65-75 (Durometer) as per ASTM D2240**
- **End Rings may be made of Steel or Ductile Iron**
- **Bolt shall meet: ASTM A307 for Carbon Steel or ASTM F593 for Stainless Steel**
- **Coatings and Coating Test Per AWWA C213 for Fusion Bonded Epoxy**
- **Also may include C210, C218, C222, C224 or C550**
- **All materials must conform to nationally recognized standards**

# AWWA C 219 Design Highlights

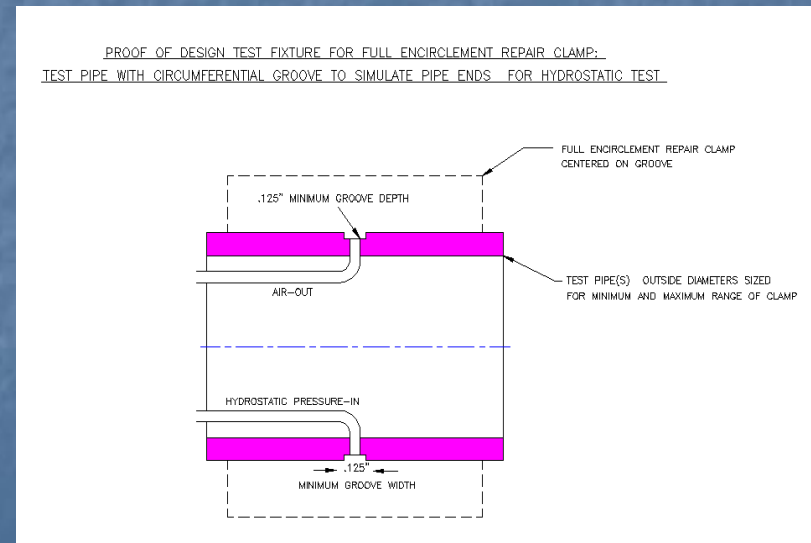
- **End Rings are designed to Retain, Seal and Control long term relaxation of gaskets caused by creep**
- **Product to be Free of Irregularities**
- **May be cast, rolled, flash welded, butt welded**
- **Welded Products Must be cold expanded after welding or hydrostatically tested after welding**
- **Must meet pressure vessel code of AWS**



# Pressures Testing



- Manufactures proof of design test for each nominal size
- Hydrostatic Pressure Test to 1.5X Rated Pressure
- Passing the test = Leak Free Seal
- Test Reports
- Production Testing



AWWA Approved Test Fixture for  
Test of Clamps and Couplings

# Traditional: Bolted Compression Couplings

CAST STRAIGHT COUPLINGS, TRANSITION COUPLINGS, REDUCTION COUPLINGS, CUT-IN COUPLINGS & END CAP COUPLINGS



- **Through/Cross Bolted Design**
- **Wedge Gasket**
- **Ductile Iron**
- **Carbon Steel**



# Modular Couplings Can Create Inventory Management Nightmares

- **2-16" Requires over 370 inventory components**
- **Take them apart to put them on**
- **Wasted Materials**



**COUPLING SYSTEM O.D. CHART**

Fits Pipes of these Nominal O.D.'s (Inches)

Nominal Pipe Size (Inches)	Weight (Lbs)	Coupling Color	Coupling Part No.	Gasket Part No.	Gasket Weight (Lbs)	Coupling O.D. (Inches)	Coupling I.D. (Inches)	Coupling Length (Inches)	Asbestos Cement Pipe								
									Class 100			Class 150			Class 200		
									ME	RB	ME	RB	ME	RB	ME	RB	
2	2.34-2.60	Blue	33827	20076				2.38	2.50								
2 1/4	2.68-2.88	Red	33828	21366				2.88									
3	2.88-3.15	Red	34610	21368		3.13											
	3.00	Red	33829	21363			3.90										
	3.80-3.96	Blue	33830	21369				3.80	3.96			3.95	3.84	4.13	3.84		
4	3.99-4.14	Blue	33831	21359													
	4.00-4.15	Red	35209	22392		4.13	4.00										
	4.22-4.50	Red	33810	22392			4.50										
	4.46-4.86	Red	34578	22392			4.50	4.80									
	4.90-5.10	Blue	33811	21353			4.00	6.00									
6	5.11-5.45	Blue	33812	21353													
	6.00-6.15	Red	33001	22089		6.13	6.00										
	6.20-6.63	Red	34902	22093			6.63										
	6.58-6.96	Red	34579	22093			6.63	6.50									
	6.90-7.22	Blue	33803	21348				6.90	7.10	6.91		7.10	6.91	7.20	6.91		
	7.25-7.65	Gray	33804	21349				6.90	7.10	6.91	7.10	6.91	7.20	6.91	7.60		
8	8.00-8.16	Red	33805	22091		8.00											
	8.40-8.63	Red	33006	22094			8.63										
	8.54-9.11	Red	34880	22091			8.63	9.05									
	9.05-9.45	Blue	33846	21350				9.05									
	9.65-9.99	Blue	33907	21350					9.50	9.11	9.39	9.11	9.40	9.11	9.44		
10	9.90-9.95	Gray	33908	21351													
	10.00	Red	33850	21325		10.00											
	10.50-10.75	Red	33813	21355			10.75										
	11.10-11.60	Blue	33814	21356				11.10	11.40	11.24		11.47					
	11.65-11.80	Gray	33815	21357				11.72	11.40	11.24	11.47	11.72	11.66	11.88	11.66	12.12	
12	11.90-12.20	Gray	33816	21357													
	12.00	Red	33909	21359		12.00											
	12.50-12.75	Red	33817	21359			12.75										
	13.20-13.50	Blue	33820	21360				13.20	13.50	13.44							
	13.61-13.75	Blue	33821	21360							13.74						
14	13.90-14.20	Gray	33818	21361			14.00	14.00									
	14.21-14.40	Gray	33819	21361													
	15.00-15.50	Blue	33822	21363				15.59	15.65			15.60					
	15.54-15.80	Blue	33823	21363													
16	16.22	Gray	33825	21364									16.22	16.22			
	16.41-16.50	Gray	33824	21364										16.50	16.50		
	16.73-16.90	Gray	33825	21364										16.73	16.80		
18	17.20-17.50	Blue	33832	21371													
	18.48-18.90	Gray	33833	21372											18.46	18.46	
	18.90-19.20	Gray	33834	21372											18.92	19.15	

# Gasket Materials – Choosing A Seal That Best Suite Your Needs



- **The Original Wedge Gasket Seal or Dresser Type**
- Single Stage Static Sealing
- Buna N (NBR), SBR, EPDM
- Highly Torque Sensitive
- Must be evenly tightened and torqued



# Need for Wide Range

Pipe Outer Diameter Chart

This chart is based on the most recent pipe standards and information supplied by pipe manufacturers. Always check the pipe O.D. or circumference before ordering pipe joining and repair

Pipe Type	Nominal Pipe Size (inches)																				
	1/2	3/4	1	1.25	1.5	2	2.5	3	4	5	6	8	10	12	14	15	16	18	20	24	30
Copper Tubing (C.T.S.)	0.63	0.88	1.13	1.38	1.63	2.13	2.63	3.13	4.13	5.13	6.13										
Schedule 40 Steel Pipe	0.84	1.05	1.32	1.66	1.90	2.38	2.88	3.50	4.50	5.56	6.63	8.63	10.75	12.75	14.00		16.00	18.00	20.00	24.00	30.00
PVC-STD			1.32		1.90	2.38	2.88	3.50	4.50		6.63	8.63	10.75	12.75							
PVC-C.I. Size									4.80		6.90	9.05	11.10	13.20							
Polyethylene Pipe IPS		1.05	1.32	1.66	1.90	2.38		3.50	4.50	5.56	6.63	8.63	10.75	12.75	14.00		16.00	18.00	20.00	24.00	30.00
Polyethylene Pipe DI Size									4.80		6.90	9.05	11.10	13.20			17.40	19.50	21.60	25.80	
<i>Cast Iron Pipe</i>	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12	14	15	16	18	20	24	30
Class 100-250 AWWA								3.96	4.80		6.90	9.05	11.10	13.20	15.30		17.40	19.50	21.60	25.80	32.00
Class A AWWA Pit Cast						2.50		3.80	4.80		6.90	9.05	11.10	13.20	15.30		17.40	19.50	21.60	25.80	31.74
Class B AWWA Pit Cast								3.96	5.00		7.10	9.05	11.10	13.20	15.30		17.40	19.50	21.60	25.80	32.00
Class C AWWA Pit Cast								3.96	5.00		7.10	9.30	11.40	13.50	15.65		17.80	19.92	22.06	26.32	32.40
Class D AWWA Pit Cast								3.96	5.00		7.10	9.30	11.40	13.50	15.65		17.80	19.92	22.06	26.32	32.74
<i>Class 100 Asbestos Cement Pipe</i>	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12	14	15	16	18	20	24	30
Machined End								3.74	4.64		6.91	9.11	11.24	13.44	15.07		17.15	19.90	22.12	26.48	33.12
Fluid-Tite Rough Barrel								3.93	5.05		7.16	9.32	11.46	13.70	15.36		17.50				
Flintite M.E.								3.74	4.64		6.91	9.11	10.89	12.99	15.07		17.15	19.90	22.12	26.48	33.12
Flintite Rough Barrel								3.94	4.90		7.13	9.33	11.30	13.42	15.45		17.60				
Ring-Tite Rough Barrel								3.95	4.92		7.19	9.39	11.47	13.74	15.51		17.65	20.44	22.68	27.12	33.80
Permafex Rough Barrel									4.84		7.15	9.35	11.47	13.74	15.55		17.55				
Minimum Standard Rough Barrel									4.79		7.05	9.22	11.25	13.37	15.36		17.50	20.44	22.50	27.17	
Maximum Standard Rough Barrel									5.26		7.40	9.57	11.77	14.04	15.80		17.94	20.44	22.50	27.17	
<i>Class 150 Asbestos Cement Pipe</i>	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12	14	15	16	18	20	24	30
Machined End								3.84	4.81		6.91	9.11	11.66	13.92	16.22		18.46	20.94	23.28	27.96	35.00
Fluid-Tite Rough Barrel								4.03	5.14		7.12	9.32	11.85	14.11	16.41		18.65				
Flintite Rough Barrel								4.04	5.01		7.13	9.33	11.88	14.14	16.48		18.72				
Ring-Tite Rough Barrel								4.13	5.07		7.17	9.37	11.92	14.18	16.48		18.72	21.30	23.64	28.32	35.42
Permafex Rough Barrel									5.00		7.20	9.40	11.92	14.20	16.50		18.75				
Minimum Standard Rough Barrel									4.97		7.07	9.27	11.82	14.08	16.38		18.62	21.20	23.54	28.22	
Maximum Standard Rough Barrel									5.32		7.37	9.62	12.12	14.38	16.73		18.97	21.20	23.54	28.22	
<i>Class 200 Asbestos Cement Pipe</i>	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3		5	6	8	10	12	14	15	16	18	20	24	30
Fluid-Tite Rough Barrel								4.18	5.32		7.36	9.46	11.88	14.11	16.44		18.74				
Flintite Rough Barrel								4.17	5.32		7.26	9.44	11.88	14.14	16.53		18.84				
Ring-Tite Rough Barrel								4.17	5.33		7.32	9.50	11.92	14.18	16.55		18.90	22.54	25.02	29.98	37.48
Permafex Rough Barrel									5.32		7.26	9.50	11.95	14.20	16.55		18.90				
Minimum Standard Rough Barrel									5.22		7.26	9.39	11.77	14.03	16.44		18.74				
Maximum Standard Rough Barrel									5.57		7.60	9.79	12.12	14.38	16.88		19.19				

July 12, 2018

# A New Class of Couplings

- ***Two Bolts to Tighten for Fast Installation***
- ***Wide Range***
- ***T*** – Covers Three Classes of Pipe-Minimum
- ***X*** – Extended Range for Maximum Coverage
- ***3***-Stage Coating for Maximum Protection from the elements
- Exceeds AWWA C-219
- ANSI/NSF 61 Approved
- 1.3" Overall Range





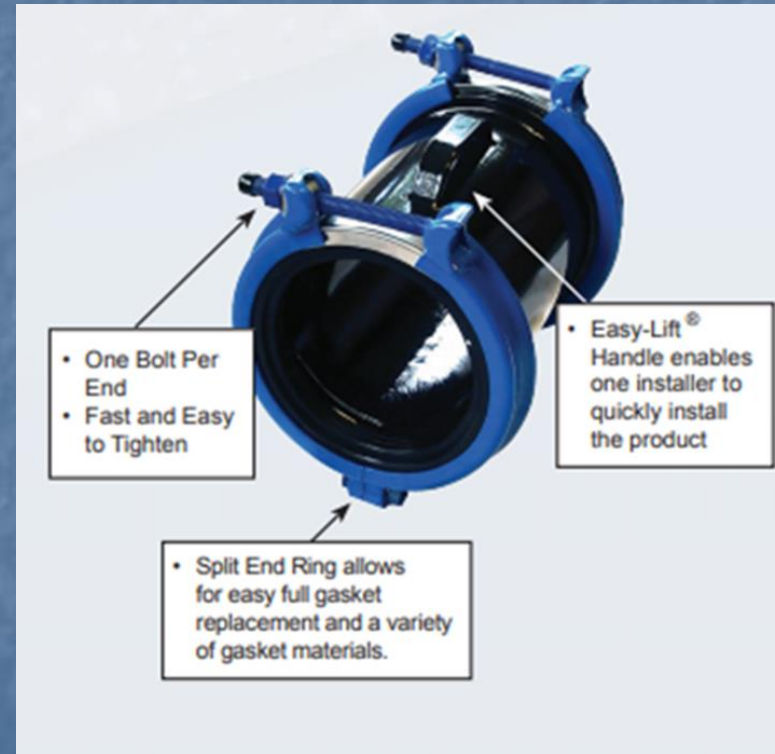
# Wide Range Design

- For use on Ductile Iron, Cast Iron, Steel, PVC, HDPE, Asbestos Cement



# A Whole New Class of Couplings – TX3

- **Easy Fit One Top Bolt Per End**
- 275 psi
- **Easy Lift Handle**
- **Light Weight**
- **Fewer Sizes (Only 9 sizes from (2" to 12"))**
- **Parts can be field replaced if damaged**



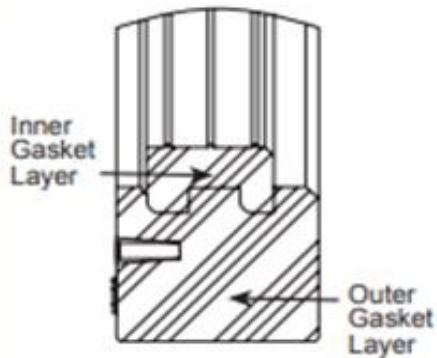


# Next Gen Products are Loaded with Extras

- Fully Replaceable Pressure Assisted Gasket Assembly with easy to replace inner layer
- Superior Coating System for Extra-Long Life



# 2 Layered Gasket System Provides Built in Range



**The 2-layered gasketing system provides a built-in wide range.**

1. Low range is provided by the inner layer
2. High range is provided by removal of inner layer
3. Each layer provides up to 4 degrees of deflection per end and working pressures to 275 psi



Use your thumb or other device to remove inner gasket layer.



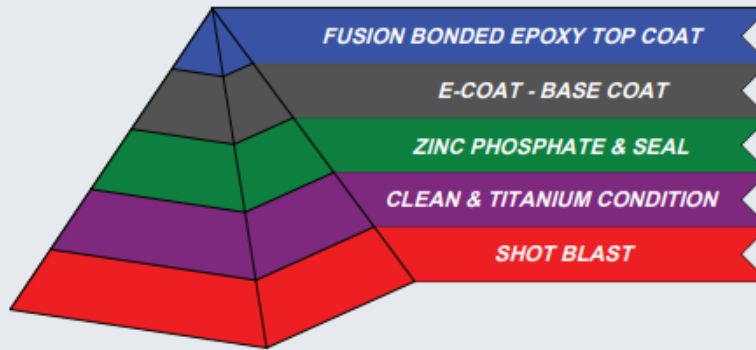
# Gasketing - For Water or Sewer

- 275 psi pressure rated, tested to 415 psi
- **NBR** - Broad Spectrum Chemical Resistance for water, oil, hydrocarbon contact
- Meets NSF-372 and **NSF 61**
- **1" of end Movement** and 4 Degrees Deflection
- **Dynamic Sealing** Under all Conditions
- Responds to torque and water pressure



# Specify a Superior Coating

## **Tri-Clad<sup>®</sup> Coating by TPS = Extended Product Life**



- Exceeds ANSI/NSF 61
- 12-15 mil Fusion Bonded Epoxy Top Coat
- Meets ANSI/AWWA C213
- Meets NACE Specifications (National Association of Corrosion Engineers)

- Tri-Clad Multi-Layered Coating System – 12-15 mils FBE Top Coat
- 13 Step Process
- Meets NACE Specs
- Exceeds ANSI/AWWA 213



# Easy Installation

- **Check Pipe O.D.**
- **Clean the Pipe and de-scale**
- **Determine Stab Depth**
- **Size the Gasket to First End**
- **Disinfect the Line**
- **Use Soapy Water to Stab On Coupling**



End Ring Splits for Easy Gasket Replacement

# Easy Installation

- **Size Gasket to the other end**
- **Stab the other end on the pipe**
- **Tighten bolts to recommended torque**
- **Re-torque if Required**
- **Recharge the Line and Check for Leaks**
- **Always follow the Manufactures Directions**





# Non-Galling 304 S.S. Nuts, Bolts and Washers

- **Standard Water Works Threads**
- **1-1/16" nut size**
- **FluoroCarbon Gall Resistance**
- **Low torque due to no-gall surfaces**
- **All other hardware 304 SS for long life**
- **Bolts Meets ASTM A193 Grade B**



304 Stainless with  
Fluoroelastomer Coated

# A Safe Installation

- **Always Use a Torque Wrench**
- **Use a Double Shot or the Long Wall 7.5" long Socket 1-1/16"**
- **Deep Well Sockets are Made for use with all 1/2" Drive Impact Tools**





# Fewer Sizes, Less Inventory, and More Performance



**2 Bolt Couplings Installs  
80% Faster than the Old  
Way**



# 2" to 12" Diameters Covers 85% of your pipe repairs

Nominal Diameter	Overall Range	LOW RANGE Before Removal of the Inner Gasket Layer	Low Range Pipe Covered	HIGH RANGE After Removal of the Inner Gasket Layer	High Range Pipe Covered
2"	2.10 - 3.03"	2.10 - 2.60"	2"CTS, 2"IPS	2.56 - 3.03"	2.5"CTS, 2.5"IPS, 2.5"DR21
3"	3.10 - 4.20"	3.10 - 3.56"	3"CTS, 3"IPS	3.70 - 4.20"	3"PIT CAST, 3" AC/100,150,200, 4"CTS
4"	4.45 - 5.61"	4.45 - 5.06"	4"IPS, 4"DIP, 4"PIT CAST,4" AC/100,150	4.94 - 5.61"	4"AC/200, 4" CLAY
6"	6.55 - 7.65"	6.55 - 7.05"	6"IPS, 6"DIP	7.04 - 7.65"	6"AC/100,150,200, 6"CLAY
8"	8.54 - 9.84"	8.54 - 9.15"	8"IPS, 8"DIP	9.15 - 9.84"	8"AC/100,150,200, 8"CLAY
10" Undersize	10.64 - 11.84"	10.64 - 11.18"	10"IPS, 10"DIP	11.18 - 11.84"	10"AC/100
10" Oversize	11.01 - 12.26"	11.01 - 11.63"	10"DIP, 10"AC/100/150	11.59 - 12.26"	10"AC/200, 10"CLAY
12" Undersize	12.62 - 13.66"	12.62 - 13.06"	12"IPS	13.10 - 13.66"	12"DIP, 12"PIT CAST
12" Oversize	13.14 - 14.45"	13.14 - 13.78"	12"DIP	13.74 - 14.45"	12"AC/100, 150, 200, 12" CLAY



# Two Bolt Advantage Simplifying Cut In Repairs

- **Fewer Bolts**
- **Tighten From the Top**
- **No Extra Parts**
- **Premium Materials**
- **304/316 Stainless Steel Hardware**
- **Some Have Removable End Rings with Replaceable Multi-Ranged 2 Layer Transitional Gasket**



# Repair Clamps - AWWA C 230-16

UNDERSTANDING THE ROLE OF AWWA AND  
IMPORTANCE OF STANDARDS



# Why the Need for a Repair Clamp Standard?

- ❑ **The way to get on the customers shelves is to be low bidder.**
- ❑ **The way to be low bidder is to cut costs out of your product.**
- ❑ **The way to cut costs is to use less or lower quality materials.**
- ❑ **The clamps installed 25 years ago are not the clamps that are made today. Today's clamps are thinner and less forgiving, thus not lasting as long as clamps made in the past.**

# Why the Need for a Repair Clamp Standard?

- ❑ The first attempt at the AWWA C230 standard was going to be 150 psi with 1.5 safety factor.
- ❑ After testing only 2 manufacturers made a clamp that could meet the standard up to 12".
- ❑ The compromise was to put the responsibility on the end user to specify the working pressure, then the clamp should meet 1.5 times that pressure. (60 psi working pressure, clamp can only test to 90 psi)
- ❑ So to get a 150 psi clamp (test to 225 psi) you need to specify a 150 psi working pressure or you might get a much lower rated clamp.

# Why the Need for a Repair Clamp Standard?

- **1.5% of all clamps leak with-in 48 hours of installation**
- **There is a cost Associated with These Failures**
- **AWWA C230**





# Full Encirclement Stainless Steel Repair Clamps AWWA C-230-16

- Covers Various Types of Clamps from 3-12" Diameters
- Dedicated Range
- Limited Range
- Wide Range



# AWWA Standards Define **Minimum Criteria** for Performance, Material, Fabrication and Design

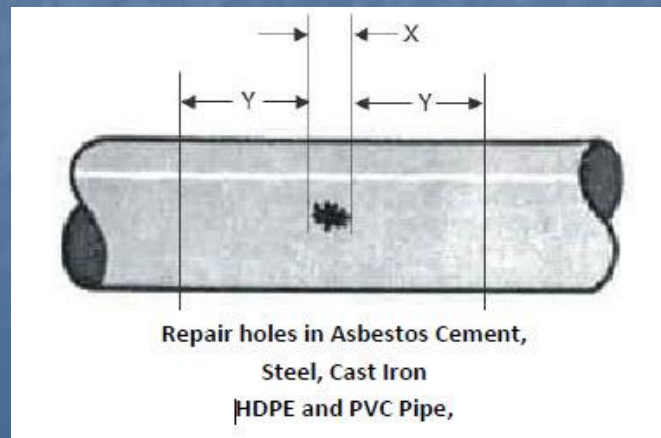
- **Must fully encircle the pipe**
- **Simple and economical means of repairing holes, cracks or breaks**
- **Allow for Service Renewals from 1/2 inch to 3 inches in diameter using tapped repair clamps**



# General Rules to Selecting a Clamp

**In the case of a hole "X", Longer Really is Better**

<u>Pipe O.D.</u>	<u>Min. Length</u>	<u>Cal. Band Length</u>
2 to 6 inch	9 Inches	= $3X + 2$ inches
8 to 12 inch	12 Inches	= $3X + 2$ inches
14 to 18 inch	15 Inches	= $3X + 2$ inches
20 to 24 Inch	15 Inches	= $3X + 2$ inches
30 to 36 inch	24 Inches	= $3X + 2$ inches





# AWWA C 230-16 Allows for Various Materials

- **Stainless Steel Band**
- **Stainless Steel Fabricated Lug**
- **Cast Ductile Iron Lugs - ASTM A536**
- **Stainless Steel Cast Lugs ASTM A351**
- Gasketing Material shall be of new, virgin natural or synthetic rubber compound. Reclaimed rubber material may not be used.
- **NSF 61 compliance**
- Gaskets shall meet ASTM D2000, have a minimum Durometer of 50, a tensile strength of 800 psi
- Temperature capabilities to 150° Fahrenheit (65°C)

# Fastener Materials

- Fasteners shall be selected to minimize galvanic corrosion, if nuts and bolts are of stainless material an anti-galling coating is recommended.
- Where coatings are utilized, they must conform to AWWA C-213 for fusion bonded epoxies



# Design Criteria

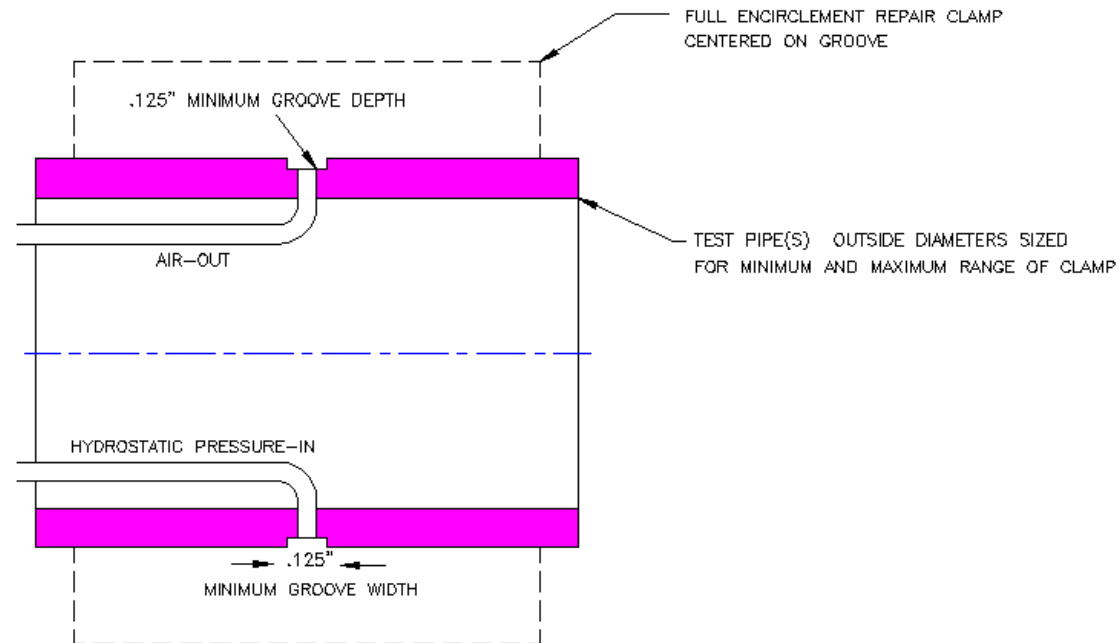
- Full 360° Sealing
- No contact between the band and any ferrous pipe materials (stainless and ductile should not touch).
- Fasteners shall be coarse threaded, and either of headed or non headed rod material, and nuts shall be hexagonal per ANSI/ASME B 18.2.2
- Tapping Outlets
- Outlets shall be internally threaded with NPT or CC (AWWA) threads. External threading or flanging shall be specified by the end user.



# Pressure Testing

- 1.5X Working Pressure Rating of System
- **Utility Must Specify the Working Pressure Required**

PROOF OF DESIGN TEST FIXTURE FOR FULL ENCIRCLEMENT REPAIR CLAMP:  
TEST PIPE WITH CIRCUMFERENTIAL GROOVE TO SIMULATE PIPE ENDS FOR HYDROSTATIC TEST



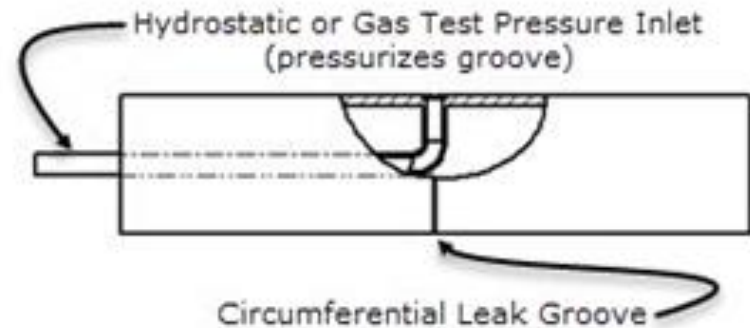
# Testing per AWWA C-230-16



Min. & Max. Steel Test Fixture With Full Break Groove



Ductile Iron Pipe Test Fixture with 3/4" Dia Drilled Hole



## 8 Inch Nominal Size Repair Clamp Range - 8.54 to 9.44 In. Pipe Diameter

8 Inch Nominal	Steel	8.54 In. Min Dia.	Water	300	Pass
8 Inch Nominal	Steel	9.44 In. Max Dia.	Water	300	Pass
8 Inch Nominal	Steel	8.54 In. Min Dia.	Gas	190	Pass
8 Inch Nominal	Steel	9.44 In. Max Dia.	Gas	190	Pass

# Traditional Repair Clamps



- 2 –12 inches diameter (28 to 32 sizes to stock per width)
- .4" Range Means Many Sizes
- Mat gasket design
- Lifter bar
- Loose nuts/bolts or Stud Welded bolts
- All weld stainless or ductile lug design
- Limited Range
- Must conform to AWWA C 230-11

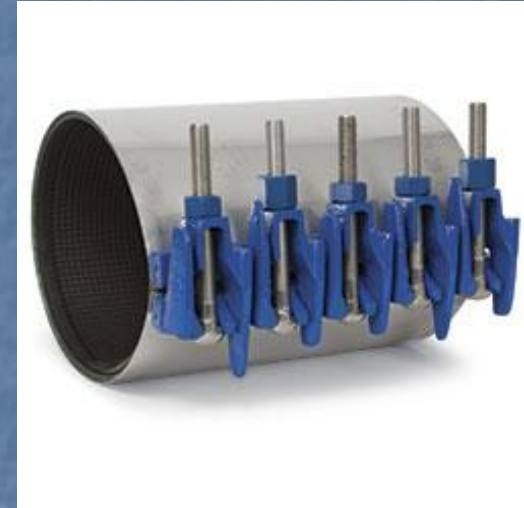


# Three Levels of Performance

■ Good



□ Better

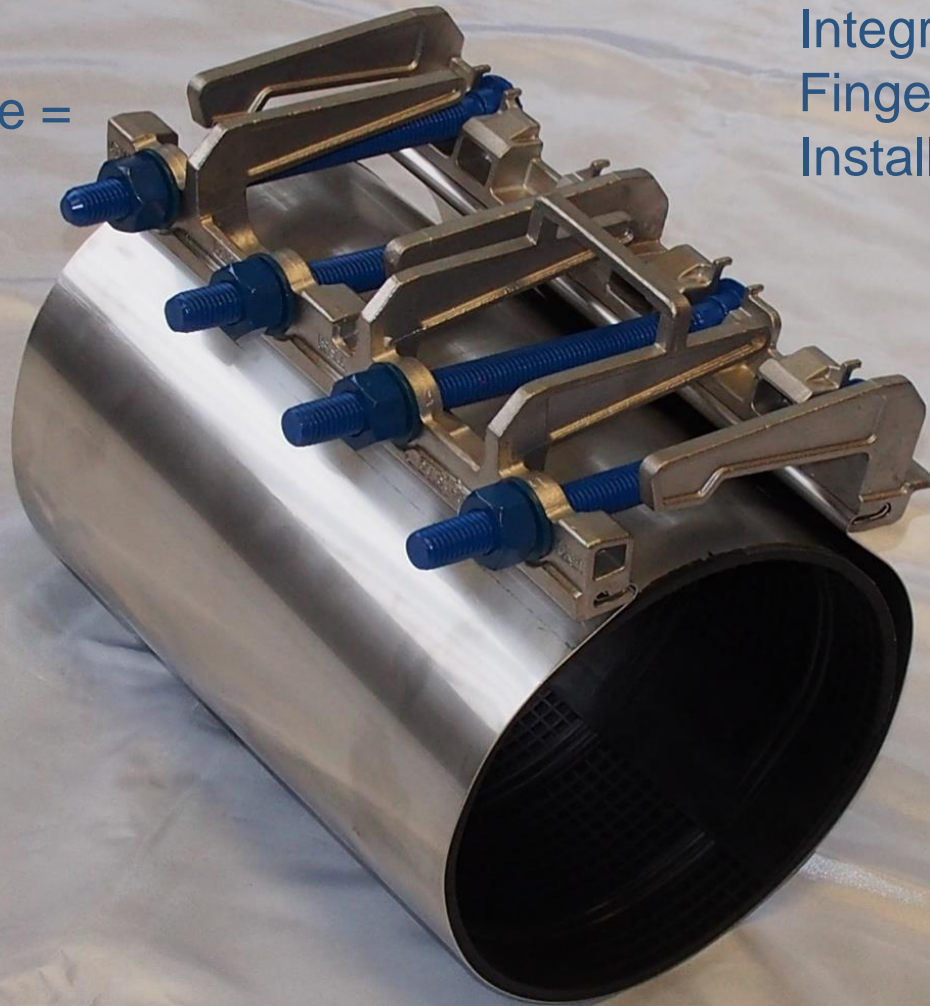


□ Best



# Desirable Clamp Features

Wide Range =  
x.9"

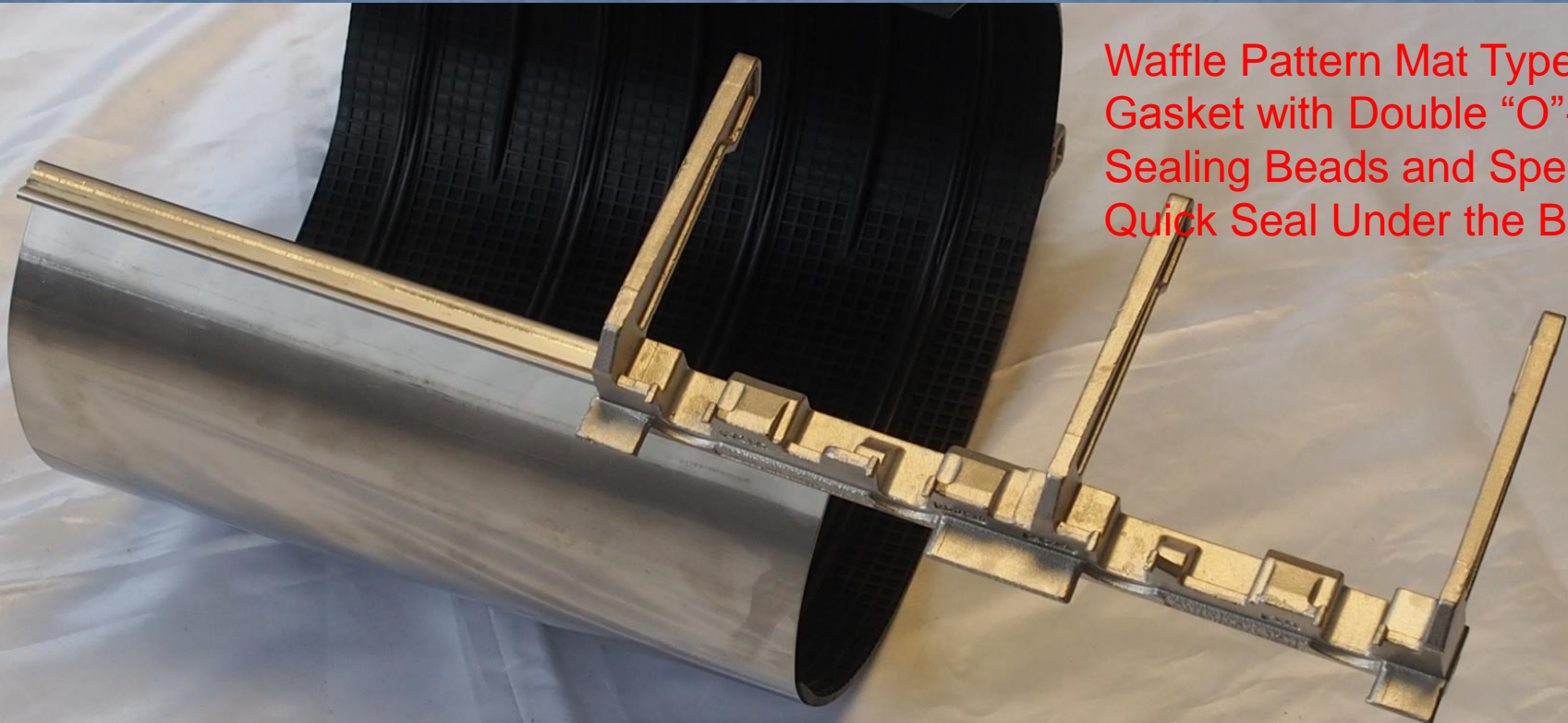


Integrated Handle and  
Finger Tab for Ease of  
Installation

**Cam Lug Finger System  
for Extended Range and  
Easier Installation with  
Fewer Bolts Per Length**



# Utilities Are Asking for Features



Waffle Pattern Mat Type  
Gasket with Double "O"-Ring  
Sealing Beads and Special  
Quick Seal Under the Bridge

Removable Lug System for  
Ease of Installation in Tight  
Spaces



# Things to Look For in A Clamp

- **Wide Range: Nine Tenths (.9") of Range eliminates double panel clamp designs**
- **Pressure Rating: High quality clamps when properly installed are capable of working pressures up to **200 psi for water applications.****
- **ANSI/NSF- 61 Approved NBR Rubber – For water, sewer, natural gas and other petroleum based line content**
- **Handle for ease of installation**
- **Clamp should be able to be installed as permanent repair.**

# Things to Look For in A Clamp

- **Non Welded Design minimizes corrosion**
- **Removable Alignment Lugs: ASTM A351 CF8 (18-8) Cast Stainless Steel (Passivated for corrosion resistance) or Optional E-Coated ASTM A536 65-45-12 Cast Ductile Iron**
- **Works on all Pipe Materials: Repair Clamps should be designed for use with **Steel, Cast Iron, Ductile Iron, PVC, High Density Polyethylene (SDR 17 or Thicker), Asbestos Cement conductor pipe materials.****

# Repair Clamps can be Permanent Repair Solutions

- **100% Corrosion Resistant 304 Stainless Steel**
- **Pressure Rated Design**
- **Chloramines Resistant Long Life NBR Gasket with multi-stage sealing**
- **Non-welded for Maximum Band Strength and minimum corrosion**
- **Stainless Steel Lug System**
- **No-gall -Nuts and Bolts**





# BELL JOINT REPAIR METHODS

## Bell Joint Encapsulation

The Repair of Split, Cracked and Leaking Bell Joints on Ductile, Cast Iron (Lead Calk Joints) and PVC

# AWWA C110 and C111

- Mechanical Joint Sleeves must meet dimensional requirements of C110/111
- Coatings and Gasketing to be Compliant with NSF 61
- Coatings Must Meet ANSI/AWWA C-213



# Bell Joint Repair

- Approximately 85% of the pipe leakage occurs in the 4, 6, 8, 10 and 12 inch diameter ranges.
- Between 20 and 25% off leaks occur at the pipe joint (**Up to 75,000 Bell Joint Leaks a Year**)
- Old lead-calk and leadite joints on Cast Iron Pipe
- Push-on joints on DIP and PVC
- Leaking collars on asbestos cement pipe
- Why Cut and Couple?
- Why shut down forcing disinfection and sampling?



# Encapsulation For:

- **On deflected leaking bell – up to 6 degrees deflection**
- **On broken bell – crack can be drilled and stress relieved**
- **On PVC and DIP Bells with rolled Seals**
- **Cover a large hole like a repair clamp**
- **Cover a leaking repair fitting (clamp or coupling)**
- **May be used on round, out of round or flat pipe sections**
- **May be used on Asbestos Cement if it fits the range**

# Typical Bell Joint Repair

- 2 Couplings and a repair pipe section
- Bell joint harness repair, exterior gasket replacement
- OR
- Complete encapsulation of the joint.
- Make the Repair Fast, and do not interrupt service

# Go to Repair: Cut Out the Bell


- Requires a water shut down, large excavation, two couplings, a repair pipe section, lot's of time and labor
- Requires boil notice and disinfection of the line and components, and Sampling after the repair






# Bell Repair sleeve® product History

- Cast Split Sleeve Repair Invented in the early 1920's
- Heavy malleable Iron Castings
- Typically Long Lead Time
- Expensive
- Many Bolts on End Seal
- Size Specific
- No Range to Product
- Fell out of favor due to cost and availability



**For repair of broken cast iron bell & spigot joints**

## Style 126 Bell-Pack® Sleeves

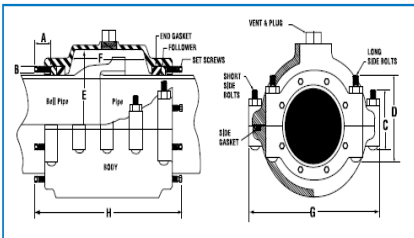


Pipeline maintenance personnel avoid pipeline shutdowns and expensive, temporary makeshift repairs by installing the Dresser® Style 126 Repair Sleeve for a fast, economical and permanent repair. A sleeve of lighter weight and compact design, the Style 126 provides maximum inside dimension clearance for repairing split cast iron bells and leaking mechanical joints.

Built to rigid Dresser specifications, Style 126 repair sleeves provide the time-proven features of the Dresser rubber-packed gasket sealing design. Side bolts, which are fully enclosed within the sleeve body to prevent corrosion, are tightened to compress side gaskets providing a complete, permanent leakproof seal.

**Materials of Construction**

**Body:** Cast or malleable iron  
**Vent Plug:** Forged steel to ASTM A105 or Cast to ASTM A126-42 Class A  
**Followers:** Cold-formed carbon steel  
**Bolt:** Alloy to AWWA C111/ANSI A21.11  
**Gaskets:** Grade 29  
**Set Screws:** Carbon steel, cadmium plated  
**Coating:** Dresser shopcoat standard; Fusion-bonded epoxy optional



**Style 126**  
**Specifications for Sizes 3" thru 24" (100 PSI)**

PIPE Nominal Size (CIP)	Outside Diameter (OD)	End Screws <sup>1</sup> Number Diam. x Length A & B	Short Side Bolts Number <sup>2</sup> Diam. x Length C	Long Side Bolts Number Diam. x Length D	Inside Dimensions Diam. Length (E) (F)	Overall Dimensions Diam. Length (G) (H)	Vent <sup>3</sup> Diam.	Max. Press. PSI	Weight Shipping Each (Lbs.)
3	3.800	12—3/8 x 1	6—5/8 x 4	4—5/8 x 5-1/2	8-1/2 12	13 19-1/16	1	100	123
3	3.960	12—3/8 x 1	6—5/8 x 4	4—5/8 x 5-1/2	8-1/2 12	13 19-1/16	1	100	123
4	4.800	12—3/8 x 1	6—5/8 x 4	4—5/8 x 6	10 12	14-1/2 19-1/16	1	100	136
4	5.000	12—3/8 x 1	6—5/8 x 4	4—5/8 x 6	10 12	14-1/2 19-1/16	1	100	136
6	6.900	16—3/8 x 1	6—5/8 x 5	4—5/8 x 7	12-1/2 12	17-1/8 19-1/16	1	100	185
6	7.100	16—3/8 x 1	6—5/8 x 7	4—5/8 x 7	12-1/2 12	17-1/8 19-1/16	1	100	185
8	9.050	20—3/8 x 1-1/4	6—5/8 x 5	4—5/8 x 7-1/2	15-1/2 12-3/8	20-1/4 19-13/16	1	100	265
8	9.300	20—3/8 x 1-1/4	6—5/8 x 5	4—5/8 x 7-1/2	15-1/2 12-3/8	20-1/4 19-13/16	1	100	265
10	11.100	24—7/16 x 2-1/4	12—3/4 x 4	-	16-5/8 13-1/2	22-3/8 18-5/8	1	100	300
10	11.400	24—7/16 x 2-1/4	12—3/4 x 4	-	16-5/8 13-1/2	22-3/8 18-5/8	1	100	300
12	13.200	28—7/16 x 2-1/4	12—7/8 x 4	-	18-3/4 13-1/2	24-1/2 18-5/8	1	100	335
12	13.500	28—7/16 x 2-1/4	12—7/8 x 4	-	18-3/4 13-1/2	24-1/2 18-5/8	1	100	335
16	17.400	32—7/16 x 2-1/4	14—7/8 x 4	-	24 16	30 21-1/8	2	100	554
16	17.800	32—7/16 x 2-1/4	14—7/8 x 4	-	24 16	30 21-1/8	2	100	554
20	21.600	40—7/16 x 2-1/4	14—1 x 4	-	30 17	36 22-1/8	3	100	770
20	22.060	40—7/16 x 2-1/4	14—1 x 4	-	30 17	36 22-1/8	3	100	770
24	25.800	48—7/16 x 2-1/4	14—1 x 4	-	33-7/8 18	39-7/8 23-1/8	3	100	853
24	26.320	48—7/16 x 2-1/4	14—1 x 4	-	33-7/8 18	39-7/8 23-1/8	3	100	853

# Bell Repair sleeve® product History

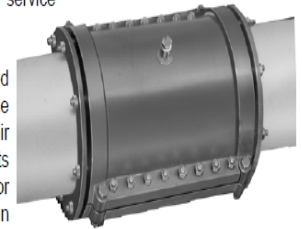
- Fabricated Steel Sleeves
- Size Specific – no range – **built per requirements**
- Many Bolts
- Heavy
- End Seal Glands to tighten
- Labor intensive
- Lead time – 2 – 3 weeks
- Today: Steel or Stainless
- Expensive

## JCM 114 Fabricated Mechanical Joint Repair Sleeve

Repair cast iron bells, split or leaking coupling and weld joints, or straight runs of pipe without costly shutdown or disruption to critical service.

**No Shutdown or Interruption of Critical Service** - by implementing a split fabricated mechanical joint design, the JCM 114 prevents costly down time and service disruption.

**True Mechanical Joint Design** - industrial grade, fabricated steel body and heavyweight pusher glands prevent the warpage and distortion experienced by lightweight repair sleeves using the split steel coupling designs. JCM 114 meets design criteria in AWWA C110/111, ANSI 21.10/21.11 for tolerances, dimensions and configuration of the time proven mechanical joint seal.



**Custom Built For Specific Application** - this versatile mechanical joint fitting is built to meet the specific requirements of special applications. Eliminates lost time due to field or factory modifications. JCM 114 sleeves are available for both limited space and full pipe section encapsulation.

**Strong and Lightweight** - the 114 sleeves are ideal for installations where strength, weight and continued service are critical. The reduced weight of high strength steel aids in installation and handling as well as minimizing weight load on the pipe.

**Available in Two Styles** - the 114 MJ Split Repair Sleeve for use on straight runs of pipe and the 114 MJ Bell Repair Sleeve which is fabricated to accommodate the specific dimensions of the bell, collar or coupling to be repaired.

Typical Application:  
Repair  
Temporary/Permanent  
Repair Pipe In Service

Cracked/Broken Pipe Joints  
Splits  
Holes  
Failed MJ Joints, Fittings or  
Couplings



Imagine repairing a leaking joint in 30 minutes or less without cutting the pipe.





# Product Specifications for a Bell Joint Repair

- **Wide Range**
- **Competitively Priced**
- **Available**
- **Fewer Bolts**
- **Automatic End Sealing (eliminates bolted gland)**
- **Vented For Blow Down**
- **Reduce Labor and Save Time**
- **Keep the Water On to Eliminate "Boil Order"**



# Bell Encapsulation Technical Criteria



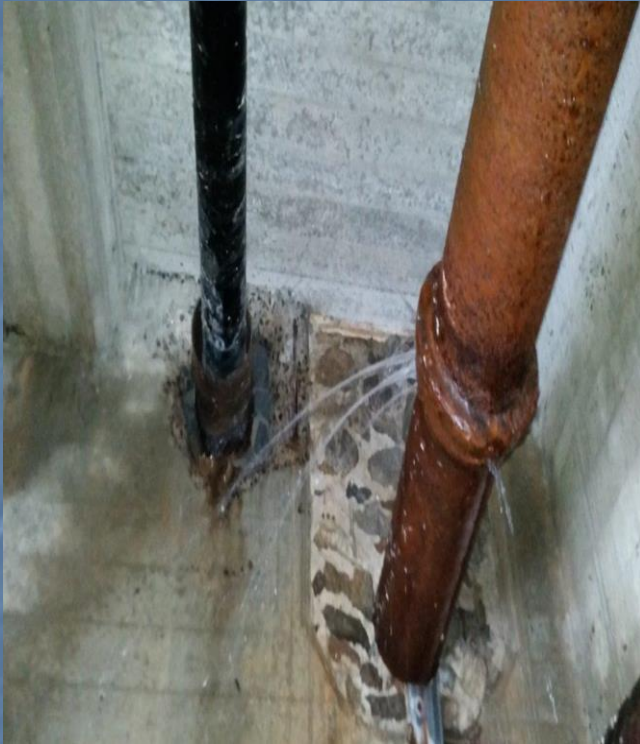
- **Working Pressure Rating – 200-250 psi**
- **Test Pressure Rating – 325-375 psi**
- **Ductile Iron (2 to 12 inch O.D.)**
- **NBR Gaskets**
- **304 Stainless Steel Nuts and Bolts** coated with anti-seize)
- **Fusion Bonded Epoxy – 10 mil minimum**
- **3-4 degrees of Pipe Deflection per end = 6-8 degrees of total deflection**
- **Temperature Range – 32 to 200 degrees**
- **Wide Range – one size will accommodate DIP and CIP (possibly more range)**
- **Shell Halves – vented to allow for pressure reduction during installation**
- **Bolts – 5/8", Nuts – 1-1/16<sup>th</sup>" (or M16)**
- **NSF Certification**
- **Patented Design**





# KCWA in Warwick, RI

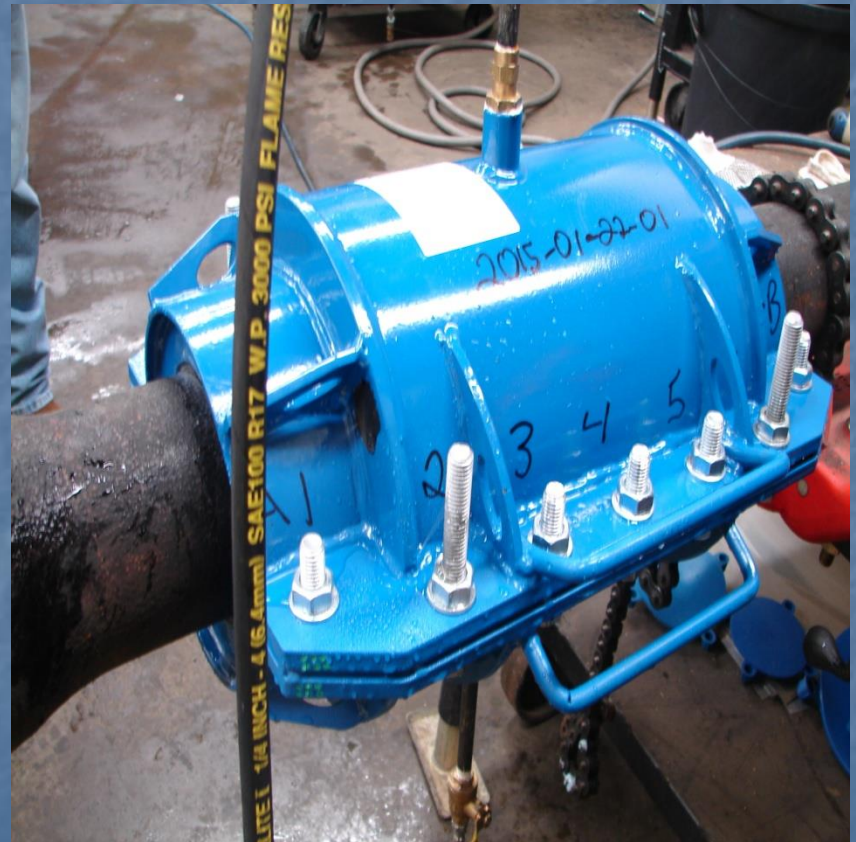
Flange Leak on Old C.I. Pipe



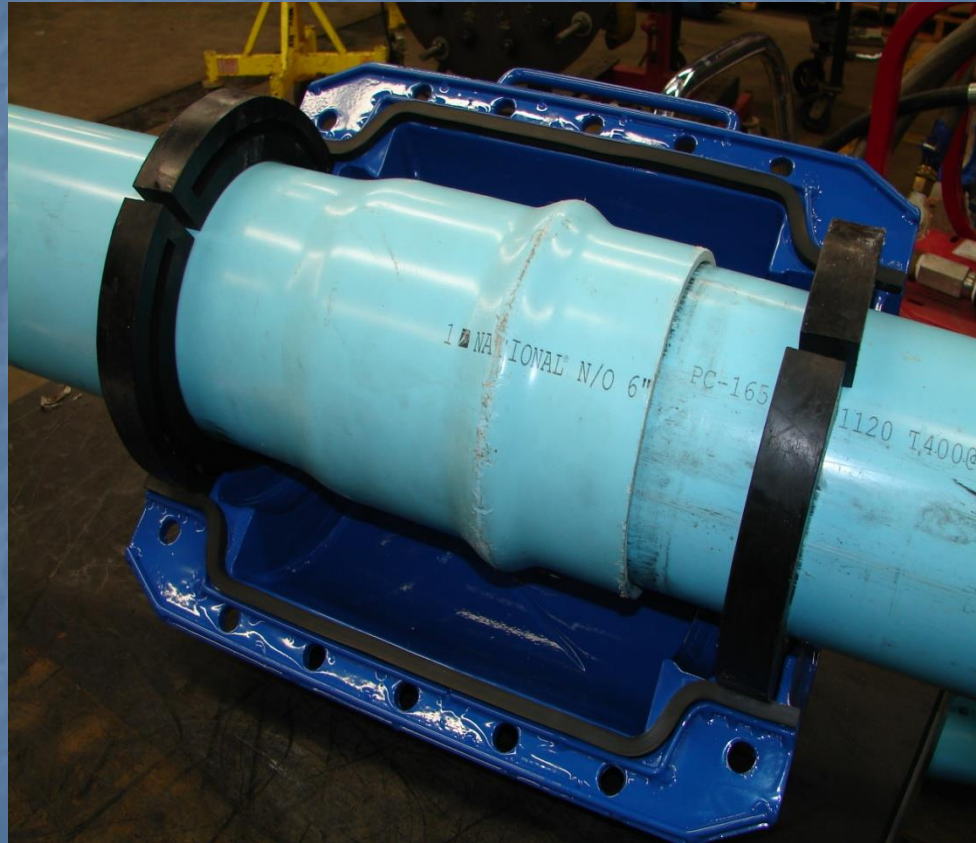
Encapsulation of Flange



# Bell Encapsulation for DIP and CIP



# Bell Encapsulation for PVC





# Installing an Encapsulation Sleeve

- Simplifies the repair method
- Cost Effective
- Provides Labor savings
- Takes Less time
- More Performance
- High Quality





# Questions?

- Thanks for your time and attention!!