

# San Antonio Water System

## San Antonio, Texas

### SPECIFICATIONS FOR PIPE JOINT RESTRAINT SYSTEMS

Revised February 2008

#### 1. SCOPE

This specification covers pipe joint restraint systems to be used on domestic water mains for PVC C-900 pipe sizes 4-inch through 12- inch diameter and PVC C-905 pipe sizes 16- inch through 24- inch diameter, and for Ductile Iron pipe sizes from 4-inch through 24-inch diameter. Joint restraint systems are classified as “compression, “mechanical joint” or non- metallic restrained joint “ for the specific type of pipe joint to be restrained.

#### 2. GENERAL REQUIREMENTS:

- A. Underwriter Laboratories (U.L) and Factory Mutual (FM) certifications are required on all restraint systems.
- B. Unless otherwise noted, restraint systems to be used on PVC C-900 and C-905 pipe shall meet or exceed A.S.T.M. Standard F1674-96, “Standard Test Methods for Joint Restraint Products for Use with PVC Pipe,” or the latest revision thereof. Restraint systems used on ductile pipe shall meet or exceed U.L. Standard 194
- C. Non-metallic restrained joint pipe and couplings shall be utilized specifically for C-900 PVC pipe and fittings in sizes 4”-12”.
- D. Each restraint system shall be packaged individually and include installation instructions.

#### 3. SPECIFIC REQUIREMENTS:

##### A. Restrainer for PVC C-900/C-905 & Ductile Iron Push-on Type Connections:

1. Pipe restraints shall be utilized to prevent movement for push-on D.I. or PVC (C900&C905) (compression type) bell and spigot pipe connections or where a flexible coupling has been used to join two sections of plain-end pipe D.I. or PVC (C900&C905). The restrainer may be adapted to connect a plain end D.I. or PVC pipe to a ductile iron mechanical joint (MJ) bell fitting. The restrainer must not be directionally sensitive.

**RESTRAINT SYSTEMS**  
**SPECIFICATION NUMBER 95-10**

2. The pipe shall be restrained by a split retainer band. The band shall be cast ductile iron, meeting or exceeding ASTM A536-80, Grade 65-45-12. The inside face or contact surface of the band shall be of sufficient width to incorporate cast or machined non-directionally sensitive serration to grip the outside circumference of the pipe. The serration shall provide full (360 degrees) contact and maintain pipe roundness and avoid any localized points of stress. The split band casting shall be designed to “bottom-out” before clamping bolt forces (110ft-lb minimum torque) can over-stress the pipe, but will provide full non-directionally sensitive restraint at the rated pressures.

3. Bolts and nuts used to attach the split retainer ring shall comply with ANSI B 18.2/18.2.2, SAE Grade 5. Tee-bolts, nuts and restraining rods shall be fabricated from high-strength, low-alloy steel per AWWA C111-90.

4. The split ring type non-directionally sensitive restrainer system shall be capable of a test pressure twice the maximum sustained working pressure listed in section D and be for both D.I. and/or PVC C900.

5. Restraint systems sizes six through twelve inches shall be capable of use for both ductile iron and/or PVC C900.

6. The restraint system may consist of two types: the two split retainer rings and for new construction use only the one split and one solid cast backup ring.

**B. Compression Ring Fitting Restrainer for Ductile Iron Pipe & PVC C-900.**

1. Compression ring with follower gland type of restrainer may be utilized in conjunction with Mechanical Joint (MJ) bell end ductile iron pipe fittings for restraining PVC C-900 and ductile iron pipe.

2. The system shall utilize a standard MJ gasket with a color-coded compression ring and replacement gland conforming to ASTM A 536-80, Grade 65-45-12.

**RESTRAINT SYSTEMS**  
**SPECIFICATION NUMBER 95-10**

3. Standard MJ fitting Tee-bolts and nuts shall be fabricated from high strength steel conforming to AWWA C111/A21.11-90 and AWWA C153/A21.53-88.

4. Standard MJ gasket shall be virgin SBR meeting ASTM D-2000 3 BA 715 or 3 BA 515.

5. The restraint system shall be capable of a test pressure twice the maximum sustained working pressure listed in section D.

C. Non-metallic restrained joint pipe and couplings for PVC C-900 Type Connections:

1. Gasketed restrained coupling connections shall join two sections of factory grooved PVC (C900) pipe. The restrainer coupling or must not be directionally sensitive.

2. The coupling shall incorporate twin elastomeric sealing gaskets meeting the requirements of ASTM F-477 and shall be DR-14 Class 200 C-900 PVC in all applications, meeting or exceeding the performance requirements of AWWA C-900, latest revision. The inside face or contact surface of the coupling connection shall be of sufficient width to incorporate a factory machined non-directionally sensitive groove in both pipe and coupling to grip the outside circumference of the pipe. The couplings shall provide full (360 degrees) contact and maintain pipe roundness and avoid and localized points of stress. The coupling shall be designed with an internal stop to align the precision-machined grooves in the coupling and pipe prior to installation of a non-metallic thermoplastic restraint spleen, and will provide full non-directionally sensitive restraint at the rated pressures.

3. High-strength flexible thermoplastic spleens shall be inserted into mating precision –machined grooves in the pipe and coupling to provide full non-directional restraint with evenly distributed loading.

**RESTRAINT SYSTEMS**  
**SPECIFICATION NUMBER 95-10**

4. The non- metallic restrained joint pipe and couplings for PVC C-900 type non-directionally sensitive restrainer system shall be capable of a test pressure twice the maximum sustained working pressure listed in Section D and be for PVC (C900) pipe sizes four through twelve inch.

5. Non-metallic restrained joint pipe and couplings for PVC C-900 restrained systems sizes four through twelve inches shall be capable of use for both Class 150 (DR 18) and four through eight inches for Class 200 (DR 14) PVC C900 pipe.

6. The non- metallic restrained joint pipe and couplings for PVC C-900 restraint system shall consist of a pipe and couplings system produced by the same manufacturer meeting the performance qualifications of Factory Mutual (FM) and Underwriters Lab (UL).

D. Fitting Restraint for Ductile Iron Pipe (Only):

1. Radial bolt type restrainer systems shall be limited to ductile iron pipe in conjunction with Mechanical Joint (MJ) bell end pipe or fittings. The system shall utilize a standard MJ gasket with a ductile iron replacement gland conforming to ASTM A 536-80. The gland dimensions shall conform to Standard MJ bolt circle criteria.

2. Individual wedge restrainers shall be ductile iron heat treated to a minimum hardness of 370 BHN. The wedge screws shall be compressed to the outside wall of the pipe using a shoulder bolt and twist-off nuts to insure proper actuating of the restraining system.

3. Standard MJ fitting Tee-bolts and nuts shall be high strength steel conforming to AWWA C111/A21.11-90 and C153/A21.53-88.

4. Standard MJ gasket shall be virgin SBR meeting ASTM D-2000 3 BA 715 or 3 BA 515.

**RESTRAINT SYSTEMS**  
**SPECIFICATION NUMBER 95-10**

D. **Maximum Sustained Working Pressure Requirements:**

<b><u>Nominal Diameter</u></b>	<b><u>PVC C-900 / C-905</u></b>		<b><u>Ductile Iron</u></b>
4 & 6 inch	200 psi		350 psi
8 inch	200 psi		250 psi
10 & 12 inch	200 psi		200 psi
14 & 16 inch	200 psi	235 psi	200 psi.
20 & 24 inch	200 psi	235 psi	200 psi

4. **TESTS:**

The San Antonio Water System may, at no cost to the manufacturer, subject random joint restraint system products to testing by an independent laboratory for compliance with these standards. Any visible defect of failure to meet the quality standards herein will be ground for rejecting the entire order.

5. **PRODUCT LIST:**

The attached qualified product list identifies specified manufacturers models approved for installation in SAWS water distribution systems.

**Approved Manufacturers and Models:**

<b><u>A. Joint Restraint System:</u></b>	<b><u>PVC C-900/C905</u></b>	<b><u>Ductile. Iron</u></b>	<b><u>D.I. 16''above</u></b>
Ford/Uni-Flange	1390C	1390C	1390C
EBAA Iron Sales, Inc	1500	1700	1700
Romac Industries, Inc. 4-8-inch	611	611	470SJ
Star Pipe Products	1100	1100	1100

<b><u>B. Compression Ring Systems:</u></b>	<b><u>PVC C-900</u></b>	<b><u>Ductile Iron</u></b>
Romac Industries, Inc.	GripRing-D1	GripRing-D1
Tyler Corporation	MJR Gland	MJR Gland
Star Pipe Products	Ring Lock 3500 Series	

**RESTRAINT SYSTEMS**  
**SPECIFICATION NUMBER 95-10**

**C. Non-Metallic Restrained Joint Pipe and Couplings for PVC C-900 RJ Type Connections:**

Certain Teed Corporation,	<u>Certa-Lok C-900/RJ</u> 4" – 12" Class 150 (DR-18) 4" – 8" Class 200 (DR-14)
---------------------------	--

**D. Fitting Restraint (MJ):**      **PVC C-900**                      **Ductile Iron**

EBBA Iron Sales, Inc.	2000 PV	Megalug1100
Romac Industries, Inc.	Not Approved	Not Approved
Ford/Uni-Flange	UFR-1500-C 4"- 24"	Series 1400
StarPipe Products	Stargrip 4000	Stargrip 4000
Sigma Corporation	One Lok SLC	One Lok SLD
Smith-Blair	Cam-lock # 120	Cam-lock # 111

**E. Restrained Flange Adapters**      **PVC C-900**                      **Ductile Iron**

EBBA Iron Sales, Inc	2100 Megaflange	2100 Megaflange
Ford/Uni-Flange	900	200,400,420

**Revised:**  
**October 2006**  
**October 05**  
**March 05**  
**Aug 2004**  
**April 2004**  
**February 2004**  
**April 2002**  
**Jan. 1998**