

Plumbing Board Request for Action

PRINT IN INK or TYPE

NAME OF SUBMITTER

Robert G Moore

PURPOSE OF REQUEST (check all that apply): ☐ New Code☒ Code Amendment ☐ Repeal of an existing Rule

The Minnesota Plumbing Code (MN Rules, Chapter 4714) is available at <http://www.dli.mn.gov/CCLD/PlumbingCode.asp>.

Specify the purpose of the proposal: (If recommendation for code change for fixture, appurtenance, material, or method, check all that apply)

☒ Appurtenance (e.g., water conditioning equipment) ☐ Test Method

☐ Other (describe) _____

Does your submission contain a Trade Secret? ☐ Yes ☒ No

If Yes, mark “**TRADE SECRET**” prominently on each page of your submission that you believe contains trade secret information. Minnesota Statutes, section 13.37, subdivision 1(b), defines “trade secret” as follows:

“Trade secret information” means government data, including a formula, pattern, compilation, program, device, method, technique or process (1) that was supplied by the affected individual or organization, (2) that is the subject of efforts by the individual or organization that are reasonable under the circumstances to maintain its secrecy, and (3) that derives independent economic value, actual or potential, from not being generally known to, and not being readily ascertainable by proper means by, other persons who can obtain economic value from its disclosure or use.

Note that, although “trade secret” information is generally not public, the Board and its committees may disclose “trade secret” information at a public meeting of the Board or committee if reasonably necessary for the Board or committee to conduct the business or agenda item before it (such as your request.) The record of the meeting will be public.

Describe the proposed change. The Minnesota Plumbing Code (Minnesota Rules Chapter 4714) is available via the World Wide Web at <http://www.revisor.leg.state.mn.us/arule/4714/>

NOTE:

- Please review the Minnesota Plumbing Code and include all parts of the Code that require revision to accomplish your purpose.
- The proposed change, including suggested rule language, should be *specific*. If modifying existing rule language, underline new words and ~~strike through deleted words~~. Please list all areas of the Minnesota Plumbing Code that would be affected.

We are asking for two pipe products be added to Chapter 11, Storm Drainage. With this change, it is our understanding that these products need to be added to the Table 701.1 in Chapter 7.

**Table 701.1
Materials for Drain, Waste, Vent Pipe and Fittings**

Material	Underground Drain, Waste, & Fittings	Aboveground Drain, Waste & Fittings	Building Sewer Pipe & Fittings	Referenced Stand. Pipe	Referenced Stand. Fittings
Profile Wall PVC	X	-		ASTM F949	ASTM F949
SRPE Pipe	X			ASTM F2562	ASTM F2562

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RFA File No. PB0126	Date Received 3.27.2019	Dated Received by Committee	Date Forwarded to Board
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Title of RFA	By:
Committee Recommendation to the Board: <input type="checkbox"/> Accept <input type="checkbox"/> Reject <input type="checkbox"/> Abstain	
Board approved as submitted: <input type="checkbox"/> Yes <input type="checkbox"/> No	Board approved as modified: <input type="checkbox"/> Yes <input type="checkbox"/> No
This material can be made available in different forms, such as large print, Braille or audio. To request, call 1-800-342-5354.	

Need and Reasons For the Change. Thoroughly explain the need and why you believe it is reasonable to make this change. During a rulemaking process, the need and reasonableness of all proposed rule changes must be justified; therefore, a detailed explanation is necessary to ensure the Board thoroughly considers all aspects of the proposal.

Storm Water regulations are more stringent today and meeting the needs of storm water storage and rain water harvesting requirements have created a need for water-tight storage pipe systems both close to and under buildings. Medium and larger diameter water-tight pipe systems are more economical for storing large quantities of storm water. In addition, large diameters pipe allow for storm water storage in a smaller footprint than smaller diameter pipes that are currently on the approval list.

We are asking for two pipe products, profile wall PVC per ASTM F949 and SRPE per ASTM F2562 be added to Chapter 11 Storm Drainage. Both of these pipe products have water-tight joints as described by ASTM D3212 testing. Both products has been used in storm, sanitary, irrigation, storm water detention, and rain water harvesting applications.

Profile Wall PVC per ASTM F949 is available in 4” through 36” diameters. The pipe has been manufactured in the USA for over 35 years with the ASTM F949 specification first given in 1984. Millions of feet have been installed in the Midwest for storm, sanitary, and storm water applications. The pipe has a double seated, fluted gasket, which provides for the best gasketed PVC pipe on the market. It has low manning’s “n” of 0.009 providing better hydraulic flow than concrete pipe, clay pipe, and other plastic pipe products. The approval of this pipe will give engineers the cost savings options to other medium diameter storm sewer pipe products with the assurance of passing an air test or other water-tight joint test.

Steel Reinforced Polyethylene Pipe (SRPE) per ASTM F2562 is available in 36” – 120” diameters. SRPE pipe has been manufactured in the USA for over 10 years. SRPE is manufactured from a high quality polyethylene plastic resin that is reinforced with high strength, 80KSI steel ribs. The additional rib reinforcement allows the pipe to be made in diameters up to 120” and handle very high fills of cover in underground utility and storm water applications. Water-tight joints of SRPE pipe can be provided with two methods of construction. The first is a steel reinforced bell and spigot with a double seated gasket up through 72” diameter. The second means of connection are an internally welded joint. These tight joints help make a water-tight systems that are idea for storm water detention and storm water rain water harvesting applications for large diameter applications.

Below are listed some of the Minnesota projects were SRPE storm water pipe systems have been installed;
US Bank Stadium, Minneapolis – 48” diameter
Allianz Field (Minnesota United FC), Saint Paul – 120” and 96” diameter
Chaska Curling Center, Chaska – 120” diameter
Krauss Anderson HQ Building (Finnegan’s Brewery), Minneapolis – 60” and 48” diameter
T3 Development, Minneapolis – 96” diameter
Artist Lofts, Minneapolis – 96” diameter
Burant Park, Phase 1 and 2, Waconia – 120” diameter
Crosby Hotel, Stillwater – 96” diameter
Douglas Corp, Saint Louis Park – 120” diameter



SRPE per ASTM F2562 with internal welded joints under construction at Allianz Field, Saint Paul, MN.

If your product/method standard(s) is not currently listed in both national codes, your Request For Action will not be considered by the Board or its committees, however, you are welcome to present at any Board meeting during the Open Forum section of the Agenda.

The proposal must be accompanied by copies of any published standards, the results of testing, and copies of any product listings, as documentation of the health, sanitation and safety performance of any materials, methods, fixtures, and/or appurtenances. If none are available, please explain:

The pipe products submitted are not currently in the national plumbing codes.

PVC per ASTM F949 is approved by the Iowa Statewide Urban Design and Specification Manual (SUDAS). Division 4 – Sewer and Drains, Section 4010 Sanitary Sewer. Section 2.01 Sanitary Sewer (Gravity mains). C.1. Comply with ASTM F949, smooth interior, corrugated exterior. Hundreds of thousands of feet of PVC ASTM F949 have been installed in Iowa on sanitary trunk sewer and storm water conveyance.

There are other federal published standards such as ASTM, AASHTO, AREMA, and the FHWA where these products have been used. Both of these products have been used in the USA for several years in storm, sanitary, irrigation, and storm water management applications. The best attributes of both the Profile Wall PVC per ASTM F949 and SRPE per ASTM F2562 are the quality of water-tight joints. Both of these pipe products are made of high quality plastic resin and have double seated gaskets which ensure the passing of air test, insuring water-tight joints.

There is a need for approval in the MN Plumbing Code because more projects requiring storm water management are within 10 feet of buildings. The project sites being redeveloped in urban areas of Minnesota create a complex design requiring medium and large diameter pipe to meet current storm water regulations.

Please attach electronic scanned copies of any literature, standards and product approvals or listings. Printed or copyrighted materials, ***along with written permission from the publisher to distribute the materials at meetings***, should be sent to the Plumbing Board, c/o Department of Labor and Industry, 443 Lafayette Road No., St. Paul, MN 55155-4344.

Primary reason for change: (check only one)

- | | |
|---|--|
| <input type="checkbox"/> Protect public, health, safety, welfare, or security | <input type="checkbox"/> Mandated by legislature |
| <input checked="" type="checkbox"/> Lower construction costs | <input type="checkbox"/> Provide uniform application |
| <input type="checkbox"/> Encourage new methods and materials | <input type="checkbox"/> Clarify provisions |
| <input type="checkbox"/> Change made at national level | <input type="checkbox"/> Situation unique to Minnesota |
| <input checked="" type="checkbox"/> Other (describe) <u>More flexibility for design engineer to meet current Storm Water Regulations.</u> | |

Anticipated benefits: (check all that apply)

- | | |
|--|--|
| <input type="checkbox"/> Save lives/reduce injuries | <input checked="" type="checkbox"/> Provide more affordable construction |
| <input type="checkbox"/> Improve uniform application | <input type="checkbox"/> Provide building property |
| <input type="checkbox"/> Improve health of indoor environment | <input type="checkbox"/> Drinking water quality protection |
| <input checked="" type="checkbox"/> Provide more construction alternatives | <input type="checkbox"/> Decrease cost of enforcement |
| <input type="checkbox"/> Reduce regulation | <input type="checkbox"/> Other (describe) _____ |

Economic impact: (explain all answers marked "yes")

1. Does the proposed change increase or decrease the cost of enforcement? ☐ Yes ☒ No If yes, explain _____

2. Does the proposed change increase or decrease the cost of compliance? ☐ Yes ☒ No If yes, explain
Include the estimated cost increase or decrease, and who will bear the cost increase or experience the cost decrease: _____

3. Are there less costly or intrusive methods to achieve the proposed change? ☐ Yes ☒ No If yes, explain _____

4. Were alternative methods considered? ☐ Yes ☒ No If no, why not? If yes, explain what alternative methods were considered and why they were rejected.

5. If there is a fiscal impact, try to explain any benefit that will offset the cost of the change. If there is no impact, mark "N/A." N/A

6. Provide a description of the classes of persons affected by a proposed change, who will bear the cost, and who will benefit. **There will be no additional cost by approving these pipe products. Cost savings will be seen by the tax payer for government funded projects, the owner of the project and therefore building tenants on private projects. This also provides the design engineer more flexibility in designing to current existing municipal and watershed storm water regulations.**

7. Does the proposed rule affect farming operations? (Agricultural buildings are exempt from the Minnesota Building Code under Minnesota Statutes, Section 326B.121.) ☐ Yes ☒ No If yes, explain

Are there any existing Federal Standards? ☐ Yes ☒ No If yes, list:

Are there any differences between the proposed change and existing federal regulations?

☐ Yes ☐ No ☒ Not applicable ☐ Unknown

If yes, describe each difference & explain why each difference is needed & reasonable.

Minnesota Statutes, section 14.127, requires the Board to determine if the cost of complying with proposed rule changes in the first year after the changes take effect will exceed \$25,000 for any small business or small city. A small business is defined as a business (either for profit or nonprofit) with less than 50 full-time employees and a small city is defined as a city with less than ten full-time employees.

During the first year after the proposed changes go into effect, will it cost more than \$25,000 for any small business or small city of comply with the change? ☐ Yes ☒ No If yes, identify by name the small business(es or small city(ies).

Will this proposed plumbing code amendment require any local government to adopt or amend an ordinance or other regulation in order to comply with the proposed plumbing code amendment? ☐ Yes ☒ No, If yes, identify by name the government(s) and ordinances(s) that will need to be amended in order to comply with the proposed plumbing code amendment.

Additional supporting documentation may also be attached to this form. Are there any additional comments you feel the Committee/Board may need to consider? If so, please state them here:

There is a need for approval in the MN Plumbing Code because more projects requiring storm water management are within 10 feet of buildings. The project sites being redeveloped in urban areas of Minnesota create a complex design requiring medium and large diameter pipe to meet current storm water regulations.

By approving these proven, water-tight, pipe products, it will create more design options and aid in the approval process for the civil design engineering community.

Information regarding submitting this form:

- Submissions are received and heard by the Committee on an “as received” basis. **Any missing documentation will delay the process, and your proposal will be listed as the date it was received “Complete.”**
- **Submit any supporting documentation to be considered**, such as manufacturer’s literature, approvals by other states, and engineering data electronically to DLI.CCLDBOARDS@state.mn.us. Once your Request For Action form has been received, it will be assigned a file number. Please reference this file number on any correspondence and supplemental submissions.
- **For copyrighted materials that must be purchased from publishers, such as published standards, product approvals or testing data, listings by agencies (IAPMO, ASSE, ASTM, etc.,) you may send just 2 copies, *along with written permission from the publisher to distribute the materials at meetings*, via U.S. Mail to: Plumbing Board, c/o Department of Labor and Industry, 443 Lafayette Road No., St. Paul, MN 55155-4344.**
- **For materials that must be submitted by U.S. Mail, please include a copy of your “Request For Action” form originally submitted and reference your assigned RFA file number.**

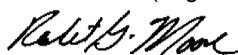
Information for presentation to the Committee and/or Board:

- Limit presentations to 5 minutes or less.
- Be prepared to answer questions regarding the proposal and any documentation.

Information regarding Committee and/or Board function:

- The Plumbing Board or designated committee.

I understand that any committee action is a recommendation to the Plumbing Board and is not to be considered final action.

SUBMITTED BY NAME		FIRM NAME	SUBMITTER'S E-MAIL ADDRESS	
Robert G Moore		CONTECH	bmoore@conteches.com	
NAME, PHONE NUMBER & E-MAIL ADDRESS OF PRESENTER TO THE COMMITTEE (if different):				
Robert G Moore				
ADDRESS		CITY	STATE	ZIP CODE
11155 Chaparral		Shakopee	MN	55379
PHONE	SIGNATURE (original or electronic)		DATE	
612-247-7134			March 26, 2019	

For Assistance or questions on completing this form, contact Cathy Tran, Department of Labor and Industry at 651-284-5898.

For Office/Committee Use Only		Proposal received completed? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Date Proposer notified of gaps:	Mode of notification (e.g., e-mail)	Date returned to Proposer:	Date materials re-received:

[Attachments located online:

<https://intrans.iastate.edu/app/uploads/sites/15/2018/12/4010.pdf>

<https://www.conteches.com/technical-guides/search?filter=W90IP2OPS9> (select "A-2000 Sewer Pipe Specification (english)")

<https://www.conteches.com/Portals/0/Documents/Brochures/A-2000%20Sanitary%20Bro.pdf?ver=2018-05-16-090413-493>]

[] indicate text added by DLI/Board staff.

SANITARY SEWERS**PART 1 - GENERAL****1.01 SECTION INCLUDES**

- A. Sanitary Sewer Gravity Mains
- B. Sanitary Sewer Force Mains
- C. Sanitary Sewer Services

1.02 DESCRIPTION OF WORK

- A. Construct sanitary sewer gravity and force mains.
- B. Construct or relocate building sanitary sewer services, stubs, and connections.

1.03 SUBMITTALS

Comply with Division 1 - General Provisions and Covenants.

1.04 SUBSTITUTIONS

Comply with Division 1 - General Provisions and Covenants.

1.05 DELIVERY, STORAGE, AND HANDLING

Comply with Division 1 - General Provisions and Covenants.

1.06 SCHEDULING AND CONFLICTS

Comply with Division 1 - General Provisions and Covenants.

1.07 SPECIAL REQUIREMENTS

None.

1.08 MEASUREMENT AND PAYMENT**A. Sanitary Sewer Gravity Main:****1. Trenched:**

- a. **Measurement:** Each type and size of pipe installed in a trench will be measured in linear feet along the centerline of the pipe from center of manhole to center of manhole.
- b. **Payment:** Payment will be made at the unit price per linear foot for each type and size of pipe.
- c. **Includes:** Unit price includes, but is not limited to, trench excavation, dewatering, furnishing bedding material, placing bedding and backfill material, wyes and other fittings, pipe joints, pipe connections, testing, and inspection.

2. Trenchless:

- a. **Measurement:** Each type and size of pipe installed by trenchless methods will be measured in linear feet along the centerline of pipe.
- b. **Payment:** Payment will be made at the unit price per linear foot for each type and size of pipe.
- c. **Includes:** Unit price includes, but is not limited to, furnishing and installing pipe; trenchless installation materials and equipment; pit excavation, dewatering, and placing backfill material; pipe connections; testing; and inspection.

1.08 MEASUREMENT AND PAYMENT (Continued)**B. Sanitary Sewer Gravity Main with Casing Pipe:****1. Trenched:**

- a. Measurement:** Each type and size of pipe installed with a casing pipe in a trench will be measured in linear feet along the centerline of the casing pipe, from end of casing to end of casing.
- b. Payment:** Payment will be made at the unit price per linear foot for each type and size of carrier pipe.
- c. Includes:** Unit price includes, but is not limited to, furnishing and installing both carrier pipe and casing pipe, trench excavation, dewatering, furnishing bedding material, placing bedding and backfill material, furnishing and installing annular space fill material, casing spacers, pipe connections, testing, and inspection.

2. Trenchless:

- a. Measurement:** Each type and size of pipe installed by trenchless methods with a casing pipe will be measured in linear feet along the centerline of the casing pipe from end of casing to end of casing.
- b. Payment:** Payment will be made at the unit price per linear foot for each type and size of carrier pipe.
- c. Includes:** Unit price includes, but is not limited to, furnishing and installing both carrier pipe and casing pipe; trenchless installation materials and equipment; pit excavation, dewatering, and placing backfill material; casing spacers; furnishing and installing annular space fill material; pipe connections; testing; and inspection.

C. Sanitary Sewer Force Main:**1. Trenched:**

- a. Measurement:** Each type and size of pipe installed in an open trench will be measured in linear feet along the centerline of the pipe from the outside wall of the pumping station to the center of manhole, or from the center of manhole to the center of manhole.
- b. Payment:** Payment will be made at the unit price per linear foot for each type and size of pipe.
- c. Includes:** Unit price includes, but is not limited to, trench excavation, dewatering, furnishing bedding material, placing bedding and backfill material, wyes and other fittings, pipe joints, testing, and inspection.

2. Trenchless:

- a. Measurement:** Each type and size of pipe installed by trenchless methods will be measured in linear feet along the centerline of the pipe.
- b. Payment:** Payment will be made at the unit price per linear foot for each type and size of pipe.
- c. Includes:** Unit price includes, but is not limited to, furnishing and installing pipe; trenchless installation materials and equipment; pit excavation, dewatering, and placing backfill material; pipe connections; testing; and inspection.

D. Sanitary Sewer Force Main with Casing Pipe:**1. Trenched:**

- a. Measurement:** Each type and size of pipe installed with a casing pipe in a trench will be measured in linear feet along the centerline of the casing pipe.
- b. Payment:** Payment will be made at the unit price per linear foot for each type and size of pipe.
- c. Includes:** Unit price includes, but is not limited to, furnishing and installing both carrier pipe and casing pipe, trench excavation, dewatering, placing bedding and backfill material, furnishing and installing annular space fill material, casing spacers, pipe connections, testing, and inspection.

1.08 MEASUREMENT AND PAYMENT (Continued)**2. Trenchless:**

- a. **Measurement:** Each type and size of pipe installed by trenchless methods with a casing pipe will be measured in linear feet along the centerline of the casing pipe.
- b. **Payment:** Payment will be made at the unit price per linear foot for each type and size of carrier pipe.
- c. **Includes:** Unit price includes, but is not limited to, furnishing and installing both carrier pipe and casing pipe; trenchless installation materials and equipment; pit excavation, dewatering, and placing backfill material; casing spacers; furnishing and installing annular space fill material; pipe connections; testing; and inspection.

E. Sanitary Sewer Service Stub: The portion of the sanitary sewer service from the main to a point 10 feet outside of the right-of-way line or as specified in the contract documents (comply with Figure 4010.201).

1. **Measurement:** Each type and size of pipe will be measured in linear feet along the centerline of the pipe from the end of the pipe to the centerline of the sewer main.
2. **Payment:** Payment will be made at the unit price per linear foot for each type and size of sanitary sewer service stub.
3. **Includes:** Unit price includes, but is not limited to, trench excavation, furnishing bedding material, placing bedding and backfill material, tap, fittings, testing, and inspection.

F. Sanitary Sewer Service Relocation: The portion of an existing sanitary sewer service in a zone of conflict.

1. **Measurement:** Each completed relocation will be counted.
2. **Payment:** Payment will be made at the unit price for each relocation.
3. **Includes:** Unit price includes, but is not limited to, removal of existing pipe, trench excavation, furnishing new pipe and bedding material, placing bedding and backfill material, connection back to existing service, compaction, testing, and inspection.

G. Sewage Air Release Valve and Pit:

1. **Measurement:** Each completed installation, including valve, accessories, and pit, will be counted.
2. **Payment:** Payment will be made at the unit price for each sewage air release valve and pit.
3. **Includes:** Unit price includes, but is not limited to, excavation, furnishing bedding material, placing bedding and backfill material, compaction, and testing.

H. Removal of Sanitary Sewer:

1. **Measurement:** Each type and size of pipe removed will be measured in linear feet from end to end.
2. **Payment:** Payment will be at the unit price per linear foot for each type and size of pipe.
3. **Includes:** Unit price includes, but is not limited to, removal, disposal, and capping (if specified) of pipe.

1.08 MEASUREMENT AND PAYMENT (Continued)**I. Sanitary Sewer Cleanout:**

- 1. Measurement:** Each sanitary sewer cleanout will be counted.
- 2. Payment:** Payment will be made at the unit price for each cleanout.
- 3. Includes:** Unit price includes, but is not limited to, plug at the end of the main, fittings, riser pipe, cap with screw plug, casting, and concrete casting encasement.

J. Connection to Existing Manhole: Connections to existing manhole will be measured and paid according to Section 6010, 1.08.**K. Sanitary Sewer Abandonment:**

- 1. Plug:** Plugging sanitary sewers is incidental to other work and will not be paid for separately.
- 2. Fill and Plug:**
 - a. Measurement:** Each size of pipe filled and plugged will be measured in linear feet from end of pipe to end of pipe.
 - b. Payment:** Payment will be at the unit price per linear foot of each size of pipe filled and plugged.

PART 2 - PRODUCTS**2.01 SANITARY SEWER (Gravity Mains)****A. Solid Wall Polyvinyl Chloride Pipe (PVC) 8 inch to 15 inch:**

1. Comply with ASTM D 3034, SDR 26, unless SDR 35 is specified.
2. Pipe stiffness per ASTM D 2412.
 - a. SDR 26: Minimum pipe stiffness of 115 psi.
 - b. SDR 35: Minimum pipe stiffness of 46 psi.
3. PVC plastic meeting ASTM D 1784, Cell Classification 12454 or 12364.
4. Integral bell and spigot joints with elastomeric seals complying with ASTM D 3212 and ASTM F 477.

B. Solid Wall Polyvinyl Chloride Pipe (PVC) 18 inch to 27 inch:

1. Comply with ASTM F 679.
2. Pipe stiffness per ASTM D 2412, 46 psi.
3. PVC plastic meeting ASTM D 1784, Cell Classification 12454 or 12364.
4. Integral bell and spigot joints with elastomeric seals complying with ASTM D 3212 and ASTM F 477.

C. Corrugated Polyvinyl Chloride Pipe (PVC) 8 inch to 36 inch:

1. Comply with ASTM F 949, smooth interior, corrugated exterior.
2. Pipe stiffness per ASTM D 2412.
 - a. 8 inch to 10 inch: Minimum pipe stiffness of 115 psi, unless 46 psi is specified.
 - b. 12 inch to 36 inch: Minimum pipe stiffness of 46 psi.
3. PVC resin meeting ASTM D 1784, Cell Classification 12454.
4. Integral bell and spigot joints with elastomeric seals complying with ASTM D 3212 and ASTM F 477.

D. Closed Profile Polyvinyl Chloride Pipe (PVC) 21 inch to 36 inch:

1. Comply with ASTM F 1803.
2. Pipe stiffness per ASTM D 2412, 46 psi.
3. PVC plastic meeting ASTM D 1784, Cell Classification 12364.
4. Integral bell and spigot joints with elastomeric seals complying with ASTM D 3212 and ASTM F 477.

2.01 SANITARY SEWER (Gravity Mains) (Continued)**E. Polyvinyl Chloride Composite Pipe (truss type PVC) 8 inch to 15 inch:**

1. Comply with ASTM D 2680. Pipe constructed with truss-type structure between inner and outer PVC walls with voids filled with lightweight concrete.
2. Pipe stiffness per ASTM D 2412, 200 psi.
3. PVC plastic meeting ASTM D 1784, Cell Classification 12454.
4. Integral bell and spigot joints with elastomeric seals complying with ASTM D 3212 and F 477.

F. Reinforced Concrete Pipe (RCP) 18 inch to 144 inch:**1. General:**

- a. Comply with ASTM C 76 (AASHTO M 170).
- b. Minimum Class IV (3000D), Wall B.
- c. Tongue and groove joints.
- d. Rubber O-ring flexible joint complying with ASTM C 443.

2. Pipe Lining:

- a. Coat interior pipe barrel and all joint surfaces with two-component coal-tar epoxy-polyamide black paint or approved equal.
- b. Lining Material: Steel Structures Painting Council (SSPC) Specification No. 16, Table 1.
 - 1) Minimum epoxy resin content 34 to 35% by dry film weight.
 - 2) Minimum sag resistance 40 mils.
 - 3) Minimum solids 80% by volume.
- c. Apply according to lining material manufacturer's recommendations.

G. Ductile Iron Pipe (DIP) 8 inch to 54 inch:**1. General:**

- a. Comply with AWWA C151.
- b. Minimum thickness Class 52.

2. Interior Linings:

- a. Provide interior lining for ductile iron pipe and fittings used for all gravity sewers and drop connections.
- b. Use linings specifically designed for sanitary sewer applications, which may include calcium aluminate, polyethylene, ceramic epoxy, and coal tar epoxy. Other lining types may be allowed upon approval of the Engineer.
- c. Apply lining to interior of unlined ductile iron pipe and fittings according to the published specifications from the manufacturer.
- d. Seal all cut ends and repair field damaged areas according to the manufacturer's recommendations.

3. Exterior Coating: Asphalt.**4. Joints:** Push-on complying with AWWA C111.**5. Fittings:** Mechanical complying with AWWA C110 or AWWA C153.

2.01 SANITARY SEWER (Gravity Mains) (Continued)**6. Polyethylene Encasement:**

- a. Comply with AWWA C105.
- b. Minimum thickness of 8 mils.
- c. Use for all ductile iron pipe and fittings in buried service.

H. Vitrified Clay Pipe (VCP) 8 inch to 42 inch:

1. Pipe and fittings complying with ASTM C 700.
2. Compression joints complying with ASTM C 425 for plain end pipe or bell and spigot pipe.
3. Test according to ASTM C 301.

I. Double Walled Polypropylene Pipe 12 inch to 30 inch:

1. Comply with ASTM F 2736.
2. Minimum pipe stiffness per ASTM D 2412, 46 psi.
3. Integral bell and spigot joint complying with ASTM D 3212 and ASTM F 477.

J. Triple Walled Polypropylene Pipe 30 inch to 36 inch:

1. Comply with ASTM F 2764.
2. Minimum pipe stiffness per ASTM D 2412, 46 psi.
3. Integral bell and spigot joint complying with ASTM D 3212 and ASTM F477.

2.02 SANITARY SEWER FORCE MAINS

A. Ductile Iron Pipe (DIP) 4 inch to 54 inch: Comply with the DIP requirements in Section 4010, 2.01. If joint restraints are specified, comply with Section 5010, 2.03.

B. Polyvinyl Chloride Pipe (PVC): Comply with the requirements in Section 5010, 2.01 for PVC pipe. Provide restrained joints when specified.

C. Sewage Air Release Valve:

1. **General:** Consists of an elongated tapered or conical body and a float to operate (open and close) under pressure without spillage. Provide valves suitable for pressures up to 150 psi. Use a float with a linkage connection to the seal plug assembly to prevent irregular air release and protect the connecting rod. Ensure the bottom of the valve body is sloped or funnel-shaped to encourage the accumulated sewage and solids to drain from the valve. Preserve a volume of air at all times between the liquid sewage and the seal plug assembly. Provide a flushing port with attachments for backwashing.

2. Materials:**a. Body and Cover:**

- 1) Stainless Steel: ASTM A 351.
- 2) Cast Iron: ASTM A 126, Grade B.
- 3) Ductile Iron: ASTM A 536, Grade 65-45-12.
- 4) Other corrosion resistant materials.

b. Internal Metal Components: Stainless steel.

2.02 SANITARY SEWER FORCE MAINS (Continued)

- c. **Float:** Stainless steel, ASTM A 240, Type 304 or Type 316, or foamed polypropylene.
 - d. **Seal Plug Assembly:** Stainless steel, foamed polypropylene, EPDM rubber, Nitrile (Buna-N) rubber, and reinforced nylon.
- 3. **Tapping Saddle:** Stainless steel or nylon.
- 4. **Pit:** Construct according to Figure 4010.202.
- D. **Tracer Wire:** Comply with Section 5010, 2.05. Tracer wire will be required on all force mains.
- E. **Tracer Wire Station:**
 - 1. Two internal terminals with shunt.
 - 2. Five to six foot plastic post (color as specified by the Jurisdiction).
 - 3. Removable top cap with lock.
 - 4. Decals indicating "Sewer Force Main" or similar language.

2.03 CASING PIPE

Comply with Section 3020, 2.02 for casing pipe requirements.

2.04 SANITARY SEWER SERVICES**A. Connection to Main:**

- 1. **PVC Main:**
 - a. Preformed wye or tee service fitting with integral bell and spigot joints with elastomeric seals complying with ASTM D 3034 or ASTM F 949.
 - b. Preformed saddle wye or saddle tee for service tap complying with ASTM D 3034 or ASTM F 949.
 - c. PVC plastic meeting ASTM D 1784, Cell Classification 12454.
- 2. **PVC Composite Main:**
 - a. Preformed wye or tee service fitting with integral bell and spigot joints with elastomeric seals complying with ASTM D 3212.
 - b. Preformed saddle wye or saddle tee for service tap complying with ASTM D 2680.
- 3. **RCP Main:** Preformed saddle wye or saddle tee service tap designed for use with RCP.
- 4. **VCP Main:**
 - a. Precast VCP wye or tee service fitting complying with ASTM C 700 for pipe and ASTM C 425 for compression joints.
 - b. Preformed saddle wye or saddle tee service tap designed for use with VCP.
- 5. **DIP Main:**
 - a. Use DIP wye or tee fittings complying with AWWA C110 or AWWA C153.
 - b. Preformed saddle wye or tee services tap designed for use with DIP. Cut the hole for the tap with equipment designed for application.

2.04 SANITARY SEWER SERVICES (Continued)

- B. Wye and Tee Pipe Stop:** All saddle wye or saddle tee fittings must provide integrally molded pipe stop in the branch for positive protection against service pipe insertion beyond the inside of sewer main pipe wall.
- C. Service Pipe:** Use products as required by local plumbing code or regulations, if applicable. Otherwise, use the following:
- 1. PVC:**
 - a. Comply with ASTM D 3034, minimum thickness SDR 23.5 minimum pipe stiffness of 153 psi as per ASTM D 2412.
 - b. PVC plastic meeting ASTM D 1784, Cell Classification 12454.
 - c. Integral bell and spigot type rubber gasket joint complying with ASTM D 3212.
 - 2. DIP:** As specified for sanitary sewer force main, including polyethylene encasement.
- D. Connection to Existing Service:** Comply with Section 4050, 2.08.

2.05 SANITARY SEWER SERVICE RELOCATIONS

- A. Comply with Section 4010, 2.04 for all materials used for sanitary service relocation.
- B. Use the same nominal size as the existing service being relocated.

2.06 SANITARY SEWER CLEANOUT

Comply with Figure 4010.203.

PART 3 - EXECUTION**3.01 EXAMINATION**

- A. Verify measurements at site. Make necessary field measurements to accurately determine pipe makeup lengths or closures.
- B. Examine site conditions to ensure construction operations do not pose hazards to adjacent structures or facilities.

3.02 GRAVITY SEWER INSTALLATION**A. General:**

- 1. Install watertight plug to prevent water from entering the existing sewer system.
- 2. Clean pipe interior and joints prior to installation. Keep pipe clean during construction.
- 3. Begin at the lowest point in the line. Lay groove or bell end pointing upstream unless otherwise specified.
- 4. Assemble joints according to Section 4010, 3.04.
- 5. Use a saw to cut ends of pipe flush with inside wall of manholes and structures. Do not use hammer or other means to break pipe.
- 6. Provide manholes as specified in the contract documents.
- 7. Install cap, plug, or bulkhead at exposed ends of pipe upon completion of construction or whenever pipe installation is not in progress.

B. Trenched:

- 1. Excavate trench and provide pipe bedding and backfill material as specified in Section 3010.
- 2. Prepare trench bottom to design line and grade so that only minor movement of the pipe is necessary after installation.
- 3. Lay pipe to design line and grade. Set field grades to invert of pipes.
- 4. Provide uniform bearing for full pipe barrel length. Excavate bell holes as necessary for uniform support of pipe barrel on bedding material.
- 5. Do not lay pipe in water or on saturated soil or bedding, or allow water to rise in trench around pipe prior to placing backfill material.
- 6. Do not disturb installed pipe and bedding when using movable trench boxes and shields. Block or anchor pipe as necessary to prevent joint displacement.
- 7. Install wye or tee service fitting at each location specified in the contract documents.

C. Trenchless: Comply with Section 3020.**3.03 SANITARY SEWER INSTALLED WITHIN A CASING PIPE**

Comply with Section 3020, 3.04 for installation of sanitary sewer within casing pipe.

3.04 GRAVITY MAIN PIPE JOINTING**A. General:**

1. Clean joint surfaces to remove soil or foreign material prior to jointing pipe.
2. Assemble joints according to pipe manufacturer's recommendations. Use equipment that does not apply damaging forces to pipe joints.

B. Polyvinyl Chloride Pipe (PVC) and Polyvinyl Chloride Composite Pipe (truss-type):

1. Coat rubber gasket and joint with soap-based lubricant immediately prior to closing joint.
2. Seal ends of PVC composite and closed profile pipe at manholes with the coating recommended by the manufacturer.

C. Reinforced Concrete Pipe (RCP): Coat rubber gasket and joint with soap-based lubricant immediately prior to closing joint.**D. Ductile Iron Pipe (DIP):**

1. Push-on Joint: Coat gasket and joint with soap-based lubricant immediately prior to closing joint.
2. Mechanical Joint: Wash plain end, bell socket, and gasket with soap solution. Press gasket into socket, set gland, and tighten bolts uniformly.

E. Polypropylene Pipe: Coat gasket and bell with lubricant immediately prior to closing joint.**F. Connections between Dissimilar Pipes:**

1. Use manufactured adapters or couplings approved by the Engineer.
2. Where adapters or couplings are not available, the Engineer may authorize use of a Type PC-2 concrete collar as shown on Figure 4020.211.

3.05 FORCE MAIN INSTALLATION**A. General:** Install according to Section 5010.**B. Tracer Wire:**

1. Required for all force main installations. Comply with Section 5010.
2. Install tracer wire station at each end of the force main and at additional locations specified in the contract documents.
3. Bury end of tracer wire station 2 feet and compact.

3.06 SANITARY SEWER SERVICE STUBS**A.** Provide sanitary sewer service stubs at locations specified in the contract documents.**B.** Install wye or tee for each service connection.

1. Connection of sanitary service to new sewer main, except RCP:
 - a. Use only factory wye or tees.
 - b. Install according to manufacturer's requirements and Section 4010, 2.04 and 3.04 for joints.

3.06 SANITARY SEWER SERVICE STUBS (Continued)

2. Connection to existing sewer main and new RCP:
 - a. Cut sewer main for service tap with hole saw or sewer tap drill.
 - b. Use preformed saddle wye or saddle tee for service tap. Use a gasketed saddle with rigid pipe mains and a solvent-cemented saddle with PVC mains.
 - c. Install according to the manufacturer's requirements, but always attach with at least two stainless steel band clamps.
- C. Install service stub from sewer main to a location 10 feet beyond the right-of-way line or as specified in the contract documents. Comply with Figure 4010.201.
 1. Install according to Section 4010, 3.02.
 2. Install service stub with a slope between 2% and 5% for 4 inch pipes, and between 1% and 5% for pipes 6 inches and greater.
 3. Terminate end of service stub 10 to 12 feet below finished ground elevation or as specified in the contract documents.
 4. If the depth of the sewer main causes the service to exceed a depth of 12 feet or a slope of 5%, install a service riser.
 5. For undeveloped properties, place watertight stopper, cap, or plug in end of sanitary sewer service. Mark the end of the service line as required by the Jurisdiction or as specified in the contract documents.
 6. For reconnection of new service pipe with existing service pipe, comply with the Jurisdiction's plumbing code.

3.07 SANITARY SEWER SERVICE RELOCATION

- A. Relocate existing sanitary sewer services that conflict with new storm or sanitary sewer installations. Existing services located within a conflict zone from 6 inches below the bottom of the proposed sewer pipe to 2 inches above the top of the proposed sewer pipe require relocation.
- B. When a conflicting service is encountered:
 1. Determine grades and elevations of the existing service and proposed main.
 2. Determine the extent of service replacement necessary to relocate the service outside of the conflict zone while maintaining a minimum 1% slope on the sewer service.
 3. If it is not feasible to maintain a minimum slope of 1% on the relocated service, a special design and additional work may be required. Stop work and contact the Engineer. Do not remove sewer service unless directed by the Engineer.
 4. If service relocation with a minimum slope of 1% is feasible, proceed with removal and replacement of the existing sanitary sewer service.
 - a. Length of replacement varies. Remove the existing service to the extent necessary to move the service out of the conflict zone.
 - b. Use all new materials complying with Section 4010, 2.04.
 - c. Re-install the service according to Section 4010, 3.02.
 - d. Maintain a minimum 1% grade on relocated service.

3.08 SANITARY SEWER ABANDONMENT**A. Plug:**

1. Prior to placing the sewer plug, the Engineer will verify the sewer line is not in use.
2. Construct sewer plug by completely filling the end of the pipe with concrete. Force concrete into the end of the pipe for a distance of 16 inches, or one-half the pipe diameter, whichever is greater.

B. Fill:

1. Prior to filling the sewer, the Engineer will verify the sewer line is not in use.
2. If specified in the contract documents, fill the line to be abandoned with flowable mortar or CLSM (comply with Section 3010) by gravity flow or pumping.

3.09 CONNECTION TO EXISTING MANHOLE

Comply with Section 6010, 3.05.

3.10 SANITARY SEWER CLEANOUT

Provide cleanouts where specified in the contract documents. Comply with Figure 4010.203.

3.11 TOLERANCES

Apply the following tolerances to utilities installed by open trench construction. For trenchless construction, comply with Section 3020.

A. Gravity Main:

1. Do not allow horizontal and vertical alignment to vary from design line and grade at any structure by more than 1% of the inside diameter of the pipe or 1/4 inch, whichever is larger.
2. Do not allow the horizontal alignment of the pipe to vary from design line at any point along the pipe by more than 1% of the inside diameter of the pipe.
3. Low spots holding water exceeding the following depths for each pipe size will be considered unacceptable and must be removed and reinstalled to proper grade.

Pipe Diameter	Maximum Low Spot Depth
8"	1/2"
10"	1/2"
12"	3/4"
15"	3/4"
18" and Larger	5% of Pipe Diameter*

* Measured to the nearest 1/2"

- B. Force Main:** Do not allow horizontal and vertical alignment of trenched force mains to vary from design line and grade by more than 3 inches.

3.12 CONFLICTS

A. Horizontal Separation of Gravity Sewers from Water Mains: Separate gravity sewer mains from water mains by a horizontal distance of at least 10 feet unless:

1. The top of a sewer main is at least 18 inches below the bottom of the water main, and
2. The sewer is placed in a separate trench or in the same trench on a bench of undisturbed earth at a minimum horizontal separation of 3 feet from the water main.
3. When it is impossible to obtain the required horizontal clearance of 3 feet and a vertical clearance of 18 inches between sewers and water mains, the sewers must be constructed of water main materials meeting the requirements of Section 5010, 2.01. However, provide a linear separation of at least 2 feet.

B. Separation of Sewer Force Mains from Water Mains: Separate sewer force mains and water mains by a horizontal distance of at least 10 feet unless:

1. The force main is constructed of water main materials meeting a minimum pressure rating of 150 psi and the requirements of Section 5010, 2.01 and
2. The sewer force main is laid at least 4 linear feet from the water main.

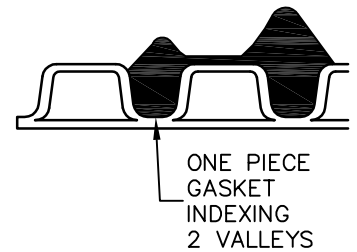
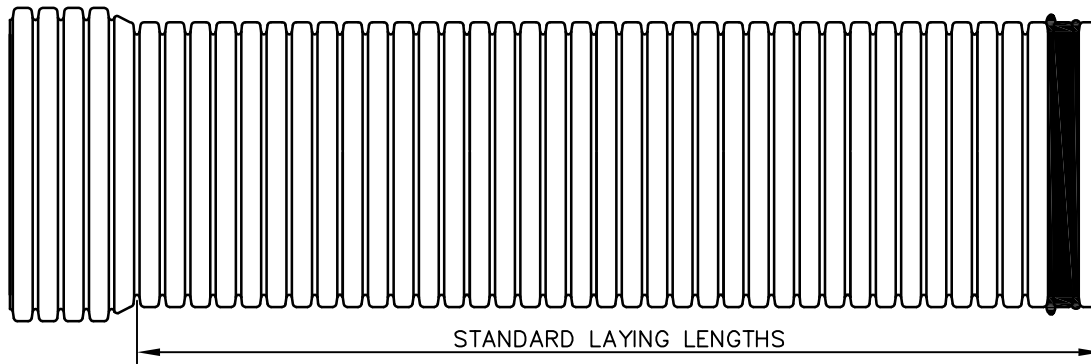
C. Separation of Sewer and Water Main Crossovers:

1. Vertical separation of sanitary sewers crossing under any water main should be at least 18 inches when measured from the top of the sewer to the bottom of the water main. If physical conditions prohibit the separation, the sewer may be placed not closer than 6 inches below a water main or 18 inches above a water main. Maintain the maximum feasible separation distance in all cases.
2. Where the sewer crosses over or less than 18 inches below a water main, locate one full length of sewer pipe of water main material so both joints are as far as possible from the water main. The sewer and water pipes must be adequately supported and have watertight joints. Use a low permeability soil for backfill material within 10 feet of the point of crossing.

3.13 CLEANING, INSPECTION, AND TESTING

Clean, inspect, and test sanitary sewer per Section 4060.

END OF SECTION



4" THRU 10" DIAMETERS = 12'-6"
12" THRU 36" DIAMETERS = 22'-0 OR 14'-0"

NOMINAL DIAMETERS (IN.)	AVERAGE O.D. (SPIGOT) (IN.)	AVERAGE O.D. (BELL) (IN.)	AVERAGE I.D. (IN.)	PIPE STIFFNESS (PSI)	MINIMUM FLATTENING (%)
4	4.3	4.9	3.9	46	40
6	6.4	6.9	5.9	46	40
8	8.6	9.3	7.9	46	40
10	10.8	11.7	9.8	46	40
12	12.8	13.9	11.7	46	40
15	15.7	16.9	14.3	46	40
18	19.2	20.6	17.6	46	40
21	22.6	24.6	20.7	46	40
24	25.6	27.9	23.5	46	40
30	32.2	35.1	29.5	46	40
36	38.7	42.3	35.5	46	40

SCOPE

THIS SPECIFICATION INCLUDES MATERIALS, TEST METHODS AND INSTALLATION REQUIREMENTS FOR 4 TO 36-INCH DIAMETER POLYVINYL CHLORIDE (PVC) CORRUGATED PIPE WITH A SMOOTH INTERIOR. THE REQUIREMENTS OF THIS SPECIFICATION ARE INTENDED TO PROVIDE PIPE AND FITTINGS SUITABLE FOR UNDERGROUND USE IN NON-PRESSURE APPLICATIONS SUCH AS SANITARY SEWERS, STORM SEWERS, DRAINAGE AND UNDERDRAINS.

PIPE

PVC CORRUGATED PIPE WITH A SMOOTH INTERIOR SHALL CONFORM TO THE REQUIREMENTS OF ASTM DESIGNATION F949. PIPE AND FITTINGS SHALL BE HOMOGENEOUS THROUGHOUT AND FREE FROM VISIBLE CRACKS, HOLES, FOREIGN INCLUSIONS OR OTHER INJURIOUS DEFECTS. PIPE SHALL BE MANUFACTURED TO 46 PSI STIFFNESS WHEN TESTED IN ACCORDANCE WITH ASTM TEST METHOD D2412. THERE SHALL BE NO EVIDENCE OF SPLITTING, CRACKING OR BREAKING WHEN THE PIPE IS TESTED PER ASTM TEST METHOD D2412 IN ACCORDANCE WITH ASTM F949 SECTION 7.5 AND ASTM F794 SECTION 8.5. THE PIPE SHALL BE MADE OF PVC COMPOUND HAVING A MINIMUM CELL CLASSIFICATION OF 12454 AS DEFINED IN ASTM SPECIFICATION D1784.

FITTINGS:

ALL FITTINGS FOR PVC CORRUGATED SEWER PIPE WITH A SMOOTH INTERIOR SHALL CONFORM TO ASTM F949, SECTION 5.2.3 OR F794, SECTION 7.2.4. TO INSURE COMPATIBILITY, THE PIPE MANUFACTURER SHALL PROVIDE ALL FITTINGS.

JOINTS:

ALL JOINTS SHALL BE MADE WITH INTEGRALLY-FORMED BELL AND SPIGOT GASKETED CONNECTIONS. THE MANUFACTURER SHALL PROVIDE DOCUMENTATION SHOWING NO LEAKAGE WHEN GASKETED PIPE JOINTS ARE TESTED IN ACCORDANCE WITH ASTM TEST METHOD D3212. ELASTOMERIC SEALS (GASKETS) SHALL MEET THE REQUIREMENTS OF ASTM DESIGNATION F477.

CONTECH ID# 0000



9025 CENTRE POINTE DRIVE, SUITE 400
WEST CHESTER, OHIO 45069
PH: 1.800.338.1122 FAX: 513.645.7399

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A-2000 PVC SEWER PIPE

PRODUCT SPECIFICATION

FOR (F949) PVC PIPE
(ENGLISH)

SCALE: N/A

DRAWN BY: FAM
DATE 10/10/08

REV. BY: —

DATE: —

SHEET:

1 of 1



CONTECH
ENGINEERED SOLUTIONS

A-2000™ PVC Pipe for
Sanitary Sewers

CONTECH
PIPE SOLUTIONS

Engineered for Performance

Manufactured by Contech® Engineered Solutions, A-2000™ represents the leading edge in sanitary sewer pipe technology with an impressive record of field-proven performance. The latest in technology and engineering design has been coupled with time-proven materials and construction practices to increase overall system performance, while offering a more cost-effective solution.

With millions of feet successfully installed, A-2000's superior strength, joint tightness and overall quality have made it a standard in the industry. More importantly, A-2000 has proven itself in a variety of applications, including sanitary sewers, storm sewers and subdrainage systems since 1984.

A Standard in the Industry

Engineered to withstand tough conditions

A-2000 is a seamless profile wall pipe extruded with a smooth interior and corrugated exterior. Made from polyvinyl chloride (PVC) compound, 12454, the most widely accepted sewer pipe material, A-2000 provides excellent durability and resistance to abrasion and scour. It withstands corrosive attack from both acidic and alkaline soils and is unaffected by chemicals found in normal sewage.

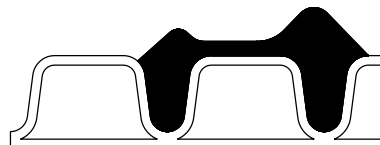
Engineered for gravity flow applications to installed depths exceeding 30 feet*, A-2000 should be specified whenever you consider using PVC sewer pipe. It has passed rigorous testing and meets the requirements of ASTM Specifications F949 and F794.

A-2000 pipe and fittings are available in 4" through 36" diameters. Standard lengths include 12-1/2' (4"-10" diameters), 14' (12"-36" diameters). A-2000 (12"-36" diameter) pipe is also available in 22' lengths.

* Depending on specific job site conditions, A-2000 can and has been successfully installed deeper than 30 feet. Call your Contech Sales Representative for specific recommendations regarding design and installation.

Industry leading gasketed joints

A-2000's tight, patented double-sealing gasketed joint contributes to the integrity of the complete sewer system. Joint tightness greatly exceeds the requirements of ASTM D3212. In fact, in joint deflection tests (as described by ASTM D3212), A-2000 stays tight under deflections as great as 40% (8 times the required 5% deflection of ASTM D3212). A-2000 provides an extra measure of reliability, not only to meet installation tests, but also to provide continued watertight performance throughout the life of the system. A-2000 gaskets meet the requirements of ASTM F477.



The double gasket is fitted into the first two full corrugation valleys on the spigot end.



Field modifications with A-2000 are quick and easy. The annular (vs. spiral) corrugated exterior creates a cutting "guide" to provide even, square pipe cuts every time. A-2000 can be easily cut with a hand or power saw. No spigot end chamfering or beveling is required. No gaskets are wasted because they are easily removed and attached on the pipe spigot.

Superior long-term performance

Unlike many PVC sewer pipes, A-2000 is manufactured from a low filler PVC compound. Using cell class 12454 compound (per ASTM D1784) with less than 5 pph (parts per hundred of PVC resin) calcium carbonate filler, A-2000 provides excellent long-term performance. The more than 30-year performance history of PVC sewer pipe has been based on low filler PVC compound 12454, much like that used in PVC water pressure pipes, which helps to ensure long-term strength properties and creep resistance.

Superior hydraulics

Even though A-2000 and solid wall PVC pipes have an accepted Manning coefficient of 0.009, visual inspection illustrates A-2000's superior flow characteristics. Its smooth, glossy interior, coupled with joint and fitting designs that minimize the recess at the bell, help ensure uninterrupted flow. The smooth interior also provides better self-cleaning action, so there is less sliming and lower maintenance costs. The lower Manning coefficient of A-2000 can result in smaller diameters or flatter grades.

Combining a quality PVC compound for long-term strength, a high pipe stiffness, a top-performing joint and a smooth-flowing interior, makes A-2000 an excellent choice for your sewer system, both initially and for years to come.

Excellent deflection control

A-2000 provides a minimum stiffness of 46 psi. When installed in accordance with ASTM D2321, A-2000 provides excellent shape control (performance). Its **seamless** design eliminates the possibility of seam separation (splitting) associated with helically wrapped thermoplastic pipe.



A-2000



Competitive PVC



Concrete

When compared with concrete, typical solid wall PVC pipe and other PVC profile wall pipe, you can see how A-2000's smooth, glossy interior provides superior flow and better self-cleaning action.

Economy

Engineered for efficiency and savings

A-2000 can reduce your costs three ways: initial purchase price, installation costs and maintenance costs.

The corrugated design of A-2000 is cost-efficient. It is engineered to provide long-term service and performance as well as potential material cost savings over other conventional sewer pipes.

During installation A-2000 saves time with a combination of features that makes installation faster and easier. A lighter handling weight and easy-to-stab joint are just two of the many benefits. Field cuts are easily made and the spigot doesn't require field chamfering. With a gasketing system that is reusable, field cut sections aren't wasted. These benefits help keep projects on schedule. Plus, A-2000 is often laid with smaller than normal crews—a real savings!

After installation and testing, A-2000 continues to save money. Its smooth interior makes it easy to clean and reduces the possibility of stoppages. Superior joints and gaskets stay tight, controlling infiltration and root penetration. A-2000's low filler PVC compound also helps to ensure long-term strength and performance.



Contech's A-2000's light weight makes it easy to handle in the field.

A-2000 offers material and installation cost savings vs. ductile iron and solid wall sewer pipe systems



A-2000's unique gasketed joint design allows easier field assembly. Pipe diameters of 4"-18" can be joined by hand, without the use of mechanical equipment.

Compatibility

Compatible with your sewer system

A-2000 is manufactured to the exact dimensional requirements of ASTM F949 to ensure joint performance and system compatibility. Unlike some other profile wall sewer pipe specifications (i.e. ASTM F794 and F1803), ASTM F949 provides inside and outside diameter control, sealing, and bell and spigot depth dimensions. This is your assurance that all pipes manufactured to ASTM F949 are compatible—fittings fit, and jointing is ensured now and in the future.

A-2000 sewer systems are compatible with ASTM D3034 sewer pipe laterals. Mainline fittings are available with either A-2000 branch hubs or D3034 branch hubs. Either lateral system can be specified without requiring field-installed adapters.

A complete package of field repair items and saddle taps are provided. However, fast, permanent repairs can also be made using many materials typically used to repair ASTM D3034 pipe. Flexible rubber adapters are compatible to allow insertion of A-2000 or D3034 repair sections. Even saddle taps can be made using D3034 saddles with approved off-the-shelf adhesives or gaskets. For large diameters, Inserta Tees® are also suitable.

Maintenance crews don't need to inventory special repair items, and, since A-2000 provides the same inside diameters as ASTM D3034 (SDR 35) pipe, deflection testing can be accomplished using SDR 35 mandrels. Connections to DWV, clean-outs, etc., are made with the same type adapter as solid wall pipes. For special connections, adapters are available from Contech and several other standard sources.



Standard flexible rubber connectors are compatible to allow use of A-2000 or SDR 35 repair sections.



SDR 35 saddle on A-2000 pipe



A-2000 tee fitting

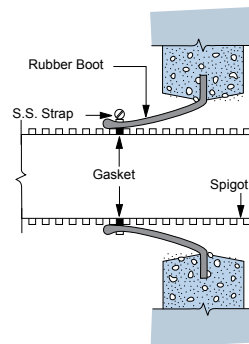
A-2000 is fully compatible with other solid wall PVC piping systems

Manhole Connections

Boot (i.e. Press Seal PSX or Press Boot)



Use a Contech manhole gasket for 12"-36" A-2000. For 8" - and 10" - diameter pipe, use a standard A-2000 double sealing gasket.



12"-36" manhole gasket

Nominal Diameter	Average Outside Diameter
4	4.3
6	6.4
8	8.6
10	10.8
12	12.8
15	15.7
18	19.2
21	22.6
24	25.6
30	32.2
36	38.7

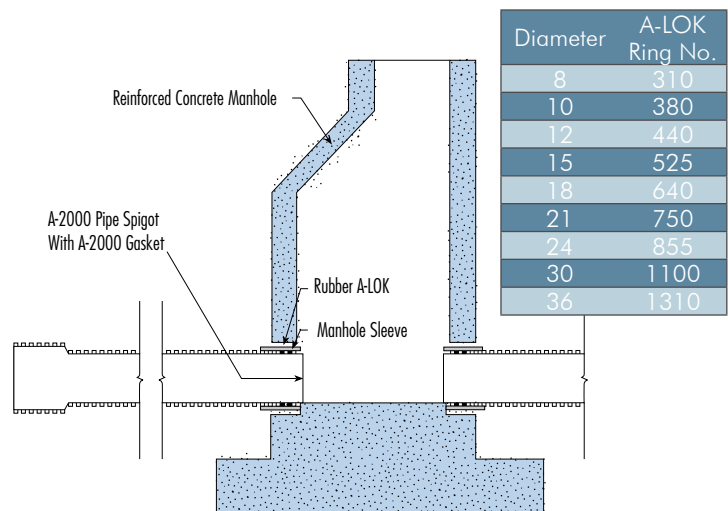
*For 21" diameter and larger pipe, the boot manufacturers recommend using two stainless steel clamp assemblies (with two screws per assembly) per boot. Clamps should be positioned evenly around the boot groove with the screws staggered so that the take-up pressure is equalized. Tighten screws of the outside clamp in an alternating pattern to the recommended torque on final screw. Check all screws again to ensure equal compression of both clamps.



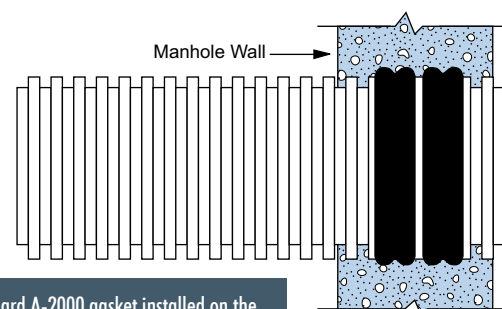
Where manholes are manufactured with A-LOK type connections, use a manhole sleeve with the recommended A-LOK ring number.

A-2000 Manhole Connector (Waterstop type)

Flexible manhole connections are recommended. For cast-in-place concrete bottoms, precast bottoms with "mouse hole" or similar pipe-to-manhole entry that does not incorporate a flexible connection, use two standard A-2000 double gaskets for 8"- and 10"-diameter pipe, positioned on the pipe in the center of the manhole wall with the leading (the lower) edge of the gaskets in adjacent corrugations, then concrete grout or seal the pipe/manhole connection as required. For pipe with diameters of 12"-36" inches, use one standard A-2000 double gasket, positioned on the pipe in the center of the manhole wall, with the leading (lower) edge of the gasket closest to the inside of the manhole.



Diameter	A-LOK Ring No.
8	310
10	380
12	440
15	525
18	640
21	750
24	855
30	1100
36	1310



A standard A-2000 gasket installed on the spigot serves as a waterstop. Two gaskets are required for 8" - and 10" diameter pipe.

Additional A-2000 Products

A2™ Liner Pipe for rehabilitating aging structures

Using the proven double wall A-2000 design, Contech developed A2 Liner Pipe for sliplining deteriorating pipelines, eliminating the need for disruptive open trench replacement.

A2 Casing Liner Pipe for crossing under highways/railroads

Crossing under a highway or railroad is common with new sanitary or storm sewer construction. Typically, crossings are accomplished by boring and installing a casing pipe. The sewer (carrier) pipe is then installed inside the casing.

By using the "no-bell," constant outside diameter design of A2 Liner Pipe for the carrier pipe, downsizing of the casing can result in a significant cost saving. In addition, A2 Liner Pipe can be supplied with runners (spacers) already attached, eliminating the need and cost to attach them in the field.

A-2000 perforated pipe for subdrainage systems

Contech A-2000 perforated pipe (4"-36" diameters) has several important features that make it the designer's first choice for subsurface drainage systems:

- 46 psi pipe stiffness for deflection control.
- Smooth interior for improved hydraulic capacity.
- Double wall design that provides essential beam strength for improved alignment and installation grade control.
- Positive gasketed jointing system.

A-2000 Drainage Pipe

Contech PVC double-wall pipe is the latest in drainage pipe technology and engineering design. A-2000 Drainage Pipe, available in 4"-36" diameters, combines the proven durability and corrosion resistance of PVC, plus a smoother interior for improved hydraulics, tight rubber gasketed joints, light weight, and long lengths (14' or 22') for easier handling and less costly installation.

Contech A-2000 Storm Sewer Pipe is manufactured per ASTM F949 and F794. When designed in accordance with AASHTO Section 18 methodology and using published 50-year PVC tensile strength values, maximum allowable heights of cover for A-2000 exceed 50' while minimum cover for highway loading (H20) is 12" with Class 1A embedment.

Contech products can solve most sewer or drainage problems. Their strength, durability and economy are proven with nearly a century of research and field performance.



A2 Liner Pipe

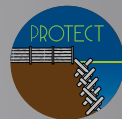
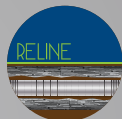
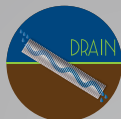


A-2000 Perforated Pipe



A-2000 Drainage Pipe





STORMWATER SOLUTIONS

Helping to satisfy stormwater management requirements on land development projects

- Stormwater Treatment
- Detention/Infiltration
- Rainwater Harvesting
- Biofiltration/Bioretenention

PIPE SOLUTIONS

Meeting project needs for durability, hydraulics, corrosion resistance, and stiffness

- Corrugated Metal Pipe (CMP)
- Steel Reinforced Polyethylene (SRPE)
- High Density Polyethylene (HDPE)
- Polyvinyl Chloride (PVC)

STRUCTURES SOLUTIONS

Providing innovative options and support for crossings, culverts, and bridges

- Plate, Precast & Truss bridges
- Hard Armor
- Retaining Walls
- Tunnel Liner Plate

A-2000™ Specifications

PVC Profile Wall Sewer Pipe

1.0 PIPE: Polyvinyl Chloride (PVC) sanitary sewer pipe and fittings shall be manufactured and tested in accordance with ASTM F949. This specification covers seamless PVC Corrugated Sewer Pipe with a smooth interior for sanitary and storm sewer applications.

2.0 MATERIAL AND DESIGN: PVC corrugated pipe with a smooth interior shall conform to the requirements of ASTM F949. Pipe and fittings shall be homogenous throughout and free from visible cracks, holes, foreign inclusions or other injurious defects. Pipe shall be manufactured to 46 PSI stiffness when tested in accordance with ASTM D2412. There shall be no evidence of splitting, cracking when the pipe is tested per ASTM D2412 in accordance with ASTM F949 Section 7.5 and ASTM F794 Section 8.5. The

pipe shall be made of PVC compound having a minimum cell classification of 12454 as defined by ASTM D1784.

3.0 JOINING SYSTEM: All fittings for PVC corrugated sewer pipe with a smooth interior shall conform to ASTM F949, Section 5.2.3 or F794, Section 7.2.4. To insure compatibility, the pipe manufacturer shall provide all fittings. All joints shall be made with integrally-formed bell and spigot gasketed connections. The manufacturer shall provide documentation showing no leakage when gasketed pipe joints are tested in accordance with ASTM D3212. Elastomeric seals (gaskets) shall meet the requirements of ASTM F477.

4.0 HYDRAULICS CAPACITY: The PVC Pipe covered in this section shall provide a Manning's "n" value of .009.

5.0 INSTALLATION: Thermoplastic pipe and fittings shall be installed in accordance with ASTM D2321.