The EGP Technique

Expanded Gasket Placement Technique Using AV-219 Oakum™ and AV-202® Multigrout

For Sealing:

Pipe Joints

Slipline Pipe Manhole Terminations

Expansion Joints

avantigrout.com

Introduction

The Slipline Pipe Terminal Sealing Process and the Expanded Gasket Placement (EGP) Technique of sealing polyethylene pipe terminals was discovered when field crews - attempting to seal a slipline terminal - soaked oakum strips in a liquid prepolymer and packed the strips around the polyethylene pipe. The resulting seal was effective and so easily accomplished that word of the process quickly spread, and others began to try the technique in a variety of leak-sealing situations such as large diameter storm and sanitary sewer pipe joints, lift holes in manholes and pipes, pick holes in manhole lids, manhole frame and corbel junctions, leaking manhole walls, expansion joints, and abandoned service connections. The ease of application coupled with the superior seal has caused wide-spread acceptance of the technique. Grout saturated oakum material creates a very dense seal which is impervious to water, yet able to tolerate joint movement. EGP seals have successfully resisted substantial forces including freeze-thaw and wet-dry cycling. Slipline Pipe Terminal Seals have also successfully resisted vibration, compression, extrusion and thermal expansion.

Material

AV-202® Mulitgrout from Avanti International was designed specifically for sealing leaks in sewer pipes. In its uncured form, the grout is a viscous liquid that looks much like honey or medium-weight motor oil. When mixed with an equal amount of water, the grout expands and quickly cures to a tough, flexible rubber. AV-219 Fibrotite™ (Oakum) acts as a reinforcing agent and a densifier. Oakum also tends to reduce cost by decreasing the amount of AV-202 required to fill the void space.

Reaction

When AV-202 is mixed with water, a reaction proceeds through two stages: Foam and Expansion, and Cure. These stages must be understood and controlled to obtain ideal results. Ambient temperature is the primary variable that affects the expansion and cure times.

Stage 1: Foam and Expansion

Within fifteen to forty-five seconds after mixing, depending upon the temperature of the grout and mix water, the material will begin to foam. The viscosity of the mix quickly increases as the foam expansion takes place. At the end of the foam time, the viscosity is optimum so that the grout will not readily flow out of the leakage site into the pipe or the soil outside the pipe. If the grout expansion is unrestrained, it may proceed to a completion volume up to 10x the original, unreacted volume of grout and water. However, unrestrained expansion produces foam of lower density, which is weaker than a more compact product. Oakum assists in retention of the grout to provide such density.

Stage 2: Cure

The Foam and Expansion stage is followed by the Cure stage. During this period, the material solidifies and forms a cellular rubber gasket which can withstand groundwater loads. After placement, the grout will continue to cure over the next several hours, but within five to ten minutes it has developed sufficient strength to form a barrier against water.

Bonding

AV-202 used in Avanti's EGP Technique and Slipline Pipe Terminal Sealing Process is an aggressive bonding agent to rough surfaces. However, bond strength is somewhat reduced by smooth surfaces. For surfaces which are coated with grease, slime, or other slick materials, cleaning is indicated. High pressure water spray is usually the quickest method. Sand and debris should be removed from the joint space to make room for the grout and oakum. The application surface should not be dry since best results are obtained on damp or pre-wetted surfaces. AV-202 saturated oakum strips may even be applied underwater.

Accelerator

Foam and cure times of AV-202 are affected by temperature; cold weather or cold ground water may cause cure times to be slower than desirable. In these cases, AV-255G Accelerator™ should be employed. It is added to the water side of the reaction mixture and contributes to both faster reaction times and increased initial strengths of the foam. AV-255G should be mixed with the water in a spray can to wet the joints and AV-202 during application. Ordinarily, AV-255G should not be used when ambient temperatures are greater than 70˚F (21˚C). One container of AV-255G should be added to 20 gallons of water. First, fill the container with water and shake. Then pour the partially diluted AV-255G into the tank. Additional water can then be added to the empty container and agitated again. This will completely clean the container of its contents. In cases when longer cure times are needed for deeper penetration, adding ice to the mix water is an effective method to slow the foam time.

Process

When reduced to basics, the process involves three simple steps:

1. Saturation of AV-219 with AV-202
2. Placement of saturated AV-219 in the leakage path
3. Curing of AV-202 in-place

Though the EGP Technique and Slipline Pipe Terminal Sealing Process can be performed by unskilled labor with minimum equipment, some preparation will save time and money.

The primary products and tools required are:

- AV-202 - Refer to SDS for hazard and safety precautions available from manufacturer
- AV-219 - Oil-Free Oakum - Meets Federal Specification HH-P-117
- Plastic bags or an empty pail
- Rubber gloves
- Full-face respirator or half-face respirator with organic vapor cartridges and safety goggles
- Fan (for blowing fresh air into application area)
- Blunt instrument (screwdriver, putty knife, etc.)

Process Cont.

The following procedures should be followed:

Step 1: Clean the crack or joint being sealed of any loose debris and foreign materials.

Step 2: Cut the oakum in various sizes to meet the requirements of the crack and holes.

Step 3: Place the oakum in a heavy-duty plastic bag or pail.

Step 4: Pour AV-202 into the plastic bag or pail. Pour enough to cover the oakum. Let the oakum soak long enough to get thoroughly saturated with the grout. The appropriate protective equipment and ventilation should be used.

Step 5: Take the saturated oakum out of the container and submerge in water for approximately five to ten seconds, then hold the oakum out of the water until the grout starts to foam (approximately five to ten seconds).

Step 6: Place the oakum into the leaking crack, joint, or hole. Use a blunt instrument, such as a screwdriver or putty knife, to drive the oakum further into the leaking area (joint). The water in the joint will continue to activate the grout that has been absorbed by the oakum.

If dry joints or cracks are being sealed, water should be sprayed into the joint or crack before inserting the activated oakum.

For the Slipline Pipe Terminal Process, place the AV-202 saturated strand into the annulus (starting at the bottom). In both processes, the oakum is lightly tamped into place by use of screwdriver, putty knives or other tools. Water is applied during the tamping process by either a small hose or weed sprayer. Application of water during the tamping causes hydration of AV-202.

Additional layers of material are built-up in the same fashion with each being wetted and tamped in turn until the full gasket thickness is obtained. Only a light spray of water should be used since large volumes of high pressures may wash away the grout before it sets. It is usually desirable to stop the application of material somewhat below the surface so that hydration will not cause the seal to expand into the flow area.

Procedures for expansion joint repairs using AV-202 will require, in addition to the above, that the joint be free of all debris or old gasket material. Sand blasting may be necessary. Further, AV-202 will require curing for a minimum of 12 hours before trimming and cleaning if the AV-202 seal has expanded above the surface area. Often it is desirable to fill cracks or joints with a surface seal, which should be a compatible material with elongation capabilities, like trowelable AV-200 Dura-Set™.

During any sealing operation, a large variety of joint spacings will be encountered. Some joints are so thin that a screwdriver or putty knife may be difficult to insert. In other cases, the gap may be so wide that soil is visible outside the joint. For very small cracks, the oakum strips may be separated into fine strands.

Containment

In many cases where narrow gaps are the norm, and a packer is not available, felt strips approximately 1/8" thick and 12" wide may be soaked in the grout compound and applied over the joint. After this material has been allowed to cure in place and bond to the concrete surface, AV-202 and water may be injected behind the felt and allowed to cure. Containment will be accomplished by the felt which has been bonded to the surface with AV-202. Plate packers are a particularly effective on flat surfaces.

Large diameter pipe which has been finished to a smooth surface may sometimes be encountered. In these cases, the oakum and grout should be worked deeply into the joint and "around the corner" in the bell-spigot juncture so that a mechanical lock will be created. Bonding to smooth surfaces is also enhanced by "painting" the surface with AV-202 prior to oakum insertion.

When placing gaskets within concrete using the double dam technique, it is necessary to inject between the seals in order to increase adhesive forces and elongation. This can be accomplished most effectively using AV-202 with foaming characteristics. It may be injected in a 1:1 ratio by angle drilling through the concrete, or by pushing through the reacted oakum gasket with a grout needle. In a soil pipeline project, where the major objective is to fill voids and encapsulate soils outside the seal, injecting AV-202 with gel properties in a 10:1 ratio is desirable.

Large Leaks

Heavy leaks or swift-flowing water may be difficult to seal because the flow displaces the grout before it can set. In these situations, a pipe nipple may be placed in the leak and activated oakum or quick-setting cement packed until all the water is flowing through the pipe nipple. When all the flow is coming through the pipe nipple, the grout pump is attached to the nipple and AV-202 is pumped to seal the leak. To obtain quick results the use of AV-255G in heavy flows may be important.

Voids

Occasionally, voids outside the pipeline are visible through gaps in the joint. Such voids are usually created by infiltration which picks up soil fines in the trench backfill and carries them into the pipeline. These voids must not be ignored. If the voids are small, it may be easier to fill them with AV-202 as the work progresses. If the voids are large, they should be filled with one of our AV-600 series soil strengthening foams so that pipeline shift and displacement are avoided. Discovery of very large cavities beneath streets is not uncommon, but timely correction will preclude collapse of the surface.

Ventilation

Ventilation is an important aspect of project planning. In confined spaces with poor ventilation, most people will find the acetone fumes objectionable and irritating to the eyes and throat.

In many large diameter pipes, a steady current of air will prevail, and in these cases work can proceed from the down-wind end of the work area. Precautions should be taken to ensure the pipe environment does not contain any toxic or suffocating gasses before entering. An air-purifying respirator equipped with an organic vapor cartridge should always be used in confined spaces and augmented by blowers or fans as appropriate.

Clean-Up

Clean-up of uncured AV-202 is usually accomplished with acetone. AV-208 Technical Grade Acetone™ is flammable and the cautions necessary for any flammable material should be followed. Since urethane resin which comes into contact with clothing cannot be removed, rain gear or disposable coveralls are highly recommended. A hat or hood helps keep the material from dripping into the hair during overhead applications.

Cleaner

AV-222 Cleaner™ dissolves and removes cured grout from hoses, pumps, tools and other components of the grouting system. Poppets, check balls, fittings or small tools may be cleaned by soaking. Cleaner should only be used where fully cured grout is present. Most day-to-day clean-up can be accomplished with acetone. Always use polyethylene or steel containers for such soaking. An overnight soak will dissolve most deposits or sufficiently soften them for easy removal.

Amounts Required for EGP Technique

Amount of AV-219 Fibrotite and AV-202 Multigrout required to seal open joints in the R.C.P. Open between 1.5“ and 2.5” (360°) over home position*

Approx. Amount AV-219 Fibrotite Required for Each Joint			Approx. Amount of AV-202 Multigrout Required for Each Joint	
Pipe I.D.	Length	Weight	Weight	Gallons
30”	8.0 ft.	3.2 lbs.	12.8 lbs.	1.4 gal.
36”	9.5 ft.	3.8 lbs.	15.2 lbs.	1.7 gal.
42”	11.0 ft.	4.4 lbs.	17.6 lbs.	1.9 gal.
48“	12.5 ft.	5.0 lbs.	20.0 lbs.	2.2 gal.
54”	14.0 ft.	5.6 lbs.	22.4 lbs.	2.5 gal.
60”	15.5 ft.	6.2 lbs.	24.8 lbs.	2.8 gal.
66”	17.0 ft.	6.8 lbs.	27.2 lbs.	3.0 gal.
72”	19.0 ft.	7.6 lbs.	30.4 lbs.	3.4 gal.
78”	20.5 ft.	8.2 lbs.	32.8 lbs.	3.6 gal.
84”	22.0 ft.	8.8 lbs.	35.2 lbs.	3.9 gal.
90”	23.5 ft.	9.4 lbs.	37.6 lbs.	4.1 gal.
96”	25.0 ft.	10.0 lbs.	40.2 lbs.	4.4 gal.

*AV-219 Fibrotite is sold and shipped in cardboard boxes containing either one (1) 50 lb. coil or (25) pre-cut 2 ft. strands.

The EGP Technique in 8 Simple Steps

EGP for Sliplined Pipe Terminal Seals

ESTIMATING FOR SLIPLINE TERMINAL SEALS

Due to the large number of possible combinations of host pipe and liner, a correspondingly large number of annular space sizes will be encountered. Oakum can be arranged in many diameters by separation of one of more strips. For very small spaces, the jute strip may be separated into fine strands.

Generally, the amount of oakum required for a single terminal seal may be found by multiplying the host pipe diameter (inches) by 0.12. Thus:

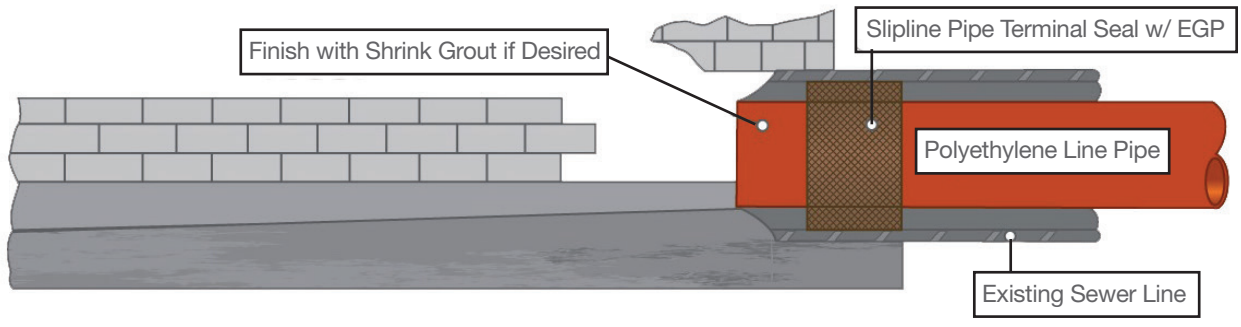
Oakum (lbs.) = 0.12 x Host Pipe Diameter (inches)

Undersized liner pipes will require correspondingly larger amounts. Once the quantity of oakum required has been calculated, the amount of AV-202 needed may be roughly determined by:

AV-202 (lbs.) = Oakum (lbs.) x 4

Slipline Terminal Sealing

"Host Carrier" Pipe I.D.	Polyethylene Pipe Slipliner Avg. O.D.	Approx. Amount AV-219 Fibrotite for Each Seal		Approx. Amount AV-202 Multigrout Required
		Weight	Length	Weight
8"	6.625"	0.96 lbs.	2 ft. 4"	4 lbs.
10"	8.625"	1.21 lbs.	2 ft. 11"	5 lbs.
12"	10.750"	1.40 lbs.	3 ft. 6"	6 lbs.
15"	12.750"	1.80 lbs.	4 ft. 5"	7.5 lbs.
18"	14.000"	2.0 lbs.	5 ft. 3"	9 lbs.
21"	18.000"	2.5 lbs.	6 ft. 2"	10.5 lbs.
24"	20.000"	2.9 lbs.	7 ft. 0"	12 lbs.
30"	28.000"	3.6 lbs.	8 ft. 9"	15 lbs.
36"	31.500"	4.3 lbs.	10 ft. 6"	18 lbs.
42"	36.000"	5.0 lbs.	12 ft. 3"	21 lbs.
48"	42.000"	5.8 lbs.	14 ft. 0"	24 lbs.
54"	47.000"	6.5 lbs.	15 ft. 9"	27 lbs.

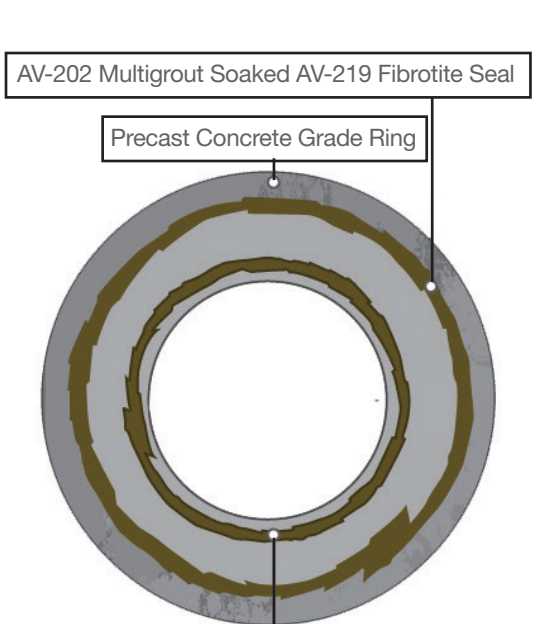


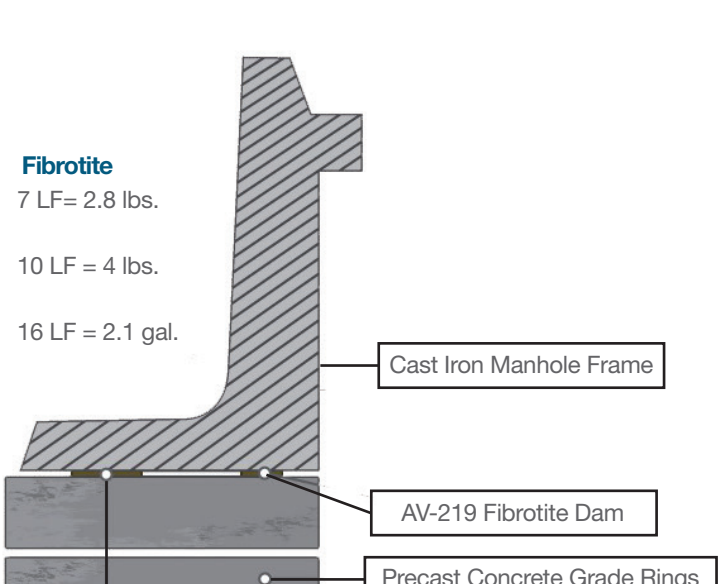
EGP - Manhole Frame & Grading Ring Sealing

Amount of AV-219 Fibrotite and AV-202 Multigrout required to “seal” between:

The cast iron manhole frame “casting” and precast concrete grade ring, bricks and/or radial blocks. Approximately 24” I.D. x 40” O.D.

	Fibrotite		**Fibrotite**
Inner Ring of AV-219 “Dam” No AV-202 Added	7 LF	=	2.8 lbs.
	Fibrotite		**Fibrotite**
Outer Ring of AV-219 Saturated with AV-202	10 LF	=	4.0 lbs
	AV-202		**AV-202**
	16 lbs.	=	2.1 gal.





Fibrotite Activated Oakum

AV-219 Fibrotite is a trade name for Avanti’s dry, twisted, jute oakum made in rope form containing no tar or oil. Fibrotite is backed by laboratory and field research that has made it tops in quality, easy to handle, and convenient to use. For EGP applications with AV-202, Fibrotite will save time and money, since it is made to pack solidly in minimum time. Double-yarn construction permits easy division of strands for use on small sealing applications.

AV-219 Fibrotite conforms to Federal Specification HH-P-117 as published in the Federal Standard Stocking Catalog, Section IV, Part 5. HH-P-117 was approved by the Director of Procurement on November 5, 1940 for the use of all departments and establishments of the Government. Copies are available from Superintendent Documents, Washington, D.C. The specification covers twisted jute packing only.

AV-219 Fibrotite is made from thoroughly carded jute fiber and is practically free from hard, coarse fibers and extraneous matter.

Only dry jute should be used for the EGP applications. AV-219 Fibrotite contains less than 8% oil by total weight of the packing.

AV-219 Fibrotite is sold and shipped in cardboard boxes containing either one (1) 50 lb. coil or (25) 2 ft. strands. The very loose weave allows rapid absorption of AV-202 in addition to ease of separation for insertion in small crevices. Store in temperatures within or near 60˚F to 100˚F (15˚C to 38˚C) and in a dry atmosphere. Keep in a sealed container away from moisture.

Recommended Products

The recommended products to use with the EGP Technique are any flexible urethanes. Typical Avanti urethane resins used with the EGP Technique include, but are not limited to:

AV-202® Multigrout
AV-202-LV Multigrout LV™
AV-248 Flexseal™

Notice

The entire body of technical literature on the polyurethane product family - particularly the safety requirements - should be read and understood prior to use of any grout material. Recommendations for the use of AV-202 is based upon tests believed to be reliable. AVANTI warrants that its own polyurethane products conform to the chemical description on the label. In no case shall AVANTI be liable for consequential, special, or indirect damages resulting from the use or handling of this product.

Warranty Statement

The data, information and statements contained herein are believed to be reliable, but are not construed as a warranty representation for which AVANTI INTERNATIONAL assumes any legal responsibility. Since field conditions vary widely, users must undertake sufficient verification and testing to determine the suitability of any product or process mentioned in this or any other written material from AVANTI INTERNATIONAL for their own particular use.

NO WARRANTY OF SUITABILITY OR FITNESS FOR A PARTICULAR PURPOSE IS MADE.

Nothing in this or any other document from AVANTI INTERNATIONAL is to be taken as permission, inducement or recommendation to practice any patented invention without a license.

Copyright© 2019 by Avanti International All rights reserved. Printed in the United States of America. Except as permitted under the United States Copyright Act of 1976, no part of this publication may be reproduced or distributed in any form or by any means, or stored in a database or retrieval system, without prior explicit written permission from Avanti International.

REV 02.19