





CertainTeed: Form-A-Drain[®] Installation Guide





DRAINS FOUNDATIONS

FORMS FOOTINGS





VENTS RADON

CertainTeed E



<u>Form-A-Drain</u>

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Hand Saw

CertainTeed: FORM-A-DRAIN[®] Installation Guide

Foreword

his installation guide was written for the foundation contractor as a guide to the proper receiving, handling and installation of CertainTeed's FORM-A-DRAIN system. FORM-A-DRAIN forms footings, drains foundations and reduces radon. Sizes available are 2-1/4"x4", 2-1/4"x6", 2-1/4"x8". Standard lineal length is 12 feet. A complete line of couplings, corners, drain outlets and accessories is available for constructing complete footing form, drainage and radon reduction systems.

The properties, dimensions and weights of lineals and fittings listed here are subject to normal manufacturing tolerances. This information is supplied for user reference only and is subject to change without notice.

FORM-A-DRAIN is the subject of BOCA Research Report #95-37 renewed annually.

FORM-A-DRAIN may be referred to as "FAD" throughout this guide.

Construction - Footing Form/Drainage

Note: Refer to local building codes/standards regarding construction regulations pertaining to excavation, footing construction practices and foundation drainage requirements.

Rough Layout

Begin with the rough layout of the required number of standard 12' lineals, couplings, 90 degree corners, 45 degree corners, drain outlets and other necessary accessory parts.



Cutting

Cut lineals with a hand or power saw to the required length. Square cuts help ensure proper alignment into couplings, corners and other accessories.







"Sawz-all"



Assembly

Insert lineals into couplings, corners, or outlets to construct each side of the footing form. Place the slotted side of the lineal to the outer side of the footing. Accessory items are manufactured to ensure a snug fit, so lubricant or solvent cement is not necessary. Spacer straps may be used to ensure proper footing width. Staking the corners with rebar may be required to hold the system in place.



Grade Stake

Forming Pin

Wood Stake

Leveling

Leveling can begin during or upon completion of the assembly of the footing form. Grade Stakes (GS018, GS030), steel forming pins, or wood stakes may be used. Place stakes on outer (slotted) side of lineal, drilling a drywall screw through hole in stake directly into lineal. Predrilled holes in wood stakes helps to position properly. For wood stakes, nail a scaffold nail through the lineal from the inner (not slotted) side of lineal; this allows for easy removal.



Reinforcing

After leveling, use grade stakes between leveling points to reinforce forms. Recommended staking distance is 3' to 5' to minimize bowing from the lateral force of the concrete pour. Place stakes on the outer (slotted) sides of the forms, or use rebar stake (1/2" grade 60 or 5/8" grade 40) through holes in coupling/corner pieces. Drive stake into ground for lateral reinforcement.



Spacer Straps

Use of spacer straps available in 16", 20" and 24" widths (SS416, SS420, SS424), speeds up the setting of forms. Spacer straps can be removed prior to concrete pour for re-use.



Change in Elevation

Should there be a requirement for changes in elevation within the foundation plans, FAD is fully adaptable through the use of Vertical "L" and Vertical "T" fittings. The flow of drainage remains continual throughout the system.



Drainage Outlet

Use a drainage outlet or outlet adapter that provides a transition to 4" round diameter. Install with the round adapter at the bottom. Drainage disposal must be done in compliance with local codes and practices.





Corrugated Pipe/Outlets

PVC Pipe/Drilled Holes

Crossover Drainage

Inner and outer drainage channels are connected by using constructing crossovers.* Crossovers from one lineal to another can be made by aligning two drainage outlets and connecting them using the appropriate diameter pipe. As an option, crossover outlet holes can be cut into lineals, then install 2 outlet adapters (AD004) in cut-out holes in lineals so they align with each other. Or use 2" or 3" PVC pipe, cutting the ends at a 45° angle to keep lineals from being blocked.



Concrete Pour and Screeding

Proceed with the concrete pour, filling the footing form with concrete. Screed off the top of the lineals upon completion. The system is left permanently in place to act as the foundation drainage and radon reduction system. DO NOT REMOVE FORMS.



Stone

Place stone in the same manner as current practice. In some cases, placing stone in place prior to the concrete pour can hold the forms in place. This eliminates the need for this step prior to wall construction. Filter Fabric - Integrated

Filter Fabric - Separate

Filter fabric needs to be used only as local codes dictate. Lineals are available with factoryapplied filter fabric adhered directly on the slotted lineal. Refer to literature sheet 40-95-08 for complete details. As an option, separate filter fabric may be installed. Partially backfill outside of footing with appropriate stone, apply geotextile or filter fabric as illustrated and complete backfilling with stone.

Alternative Form Methods

FAD can be used in different ways to accommodate various footing depths. Proceed in the same manner as current practice or code in you area dictates as with wood or metal forms. Each of the following are suggestions for installation. For maximum drainage capability, FAD should be installed on both sides of the footing.

Two-Sided Forming/Draining Installation Options



Raised/Elevated FAD: Low Slump Concrete

Depending on the footing depth required, raise the top of the lineal to meet the top elevation of the footing, i.e. if 8" lineals are being used to form a 10" footing, there would have to be 2" of 'daylight' below the bottom of the lineal and the higher point of the excavated ground. Likewise, 6" lineals may be used to form 8" footings, or 4" lineals may be used to form 6" or 8" footings.



Combination FAD with Earth or Trench Forming

This method involves both lineals plus the ground to form the required footing depth. For example, 4" lineals may be used to form an 8" footing with 4" overdig or trench excavated below the bottom of the lineal: there would be a total of 8" of concrete; 4" formed by the lineal plus 4" formed by the earth. Likewise, forming 6" + digging 4" = 10" total, forming 6" + digging 6" = 12" total, forming 8" + digging 4" = 12" total, and forming 8" + digging 6" = 14" total.



Perimeter Excavation Only: Higher Slump Concrete

Some contractors prefer this method to save on excavation and gravel cost. In this method, a wide (typically 3' to 4') area around the perimeter of the floor plan is dug 4" to 6" deeper than the center. Undisturbed earth remains in the center of the excavation. The lineals are then installed such that 4" of the footing height is above the undisturbed earth, and 2" to 4" is below. The trench is then filled with gravel, and a 4" layer of gravel is spread over the undisturbed earth to serve as the sub-base for the basement slab.

One-Sided Forming/Draining Installation

Above are suggestions to consider in one-sided drainage applications. Drawings depict inside and outside one-sided drainage. When addressing one-sided drainage, FAD may be used on either the outside or the inside.



Raised/Elevated FAD: Low-Slump Concrete

May be formed several inches above the base of excavation to provide a footing deeper than lineal height.



Combination FAD with Earth or Trench Forming

Formed directly on the base of the excavation, then trenched out to provide the necessary footing depth.



Perimeter Excavation Only: Higher-Slump Concrete

Formed directly on the base of the excavation, then trenched out to provide necessary footing depth.

Form-A-Drain Radon Reduction System Installation

Sub-Slab Perimeter System—Passive or Active

Install FAD according to the following instructions for conformance with the EPA "Model Standards and Techniques for Control of Radon in New Residential Buildings".

FAD also conforms to ASTM E 1465-92 Standard Guide for Radon Control Options for the Design and Construction of New Low-Rise Residential Buildings.

Install FAD in accordance with general installation instructions to function as a radon perimeter foundation system, with the following exceptions: Install one additional outlet in the system for use as the radon gas outlet. This should be placed in position near an interior chase where the vertical stack vent pipe run is going to be located. The outlet must be installed "upside down" with the round adapter at the top (see Figure 1).

For Passive Systems

- **1.** Passive venting systems, without a fan, must have the vertical stack vent pipe installed to the interior of the structure, not through the outside wall. This is to ensure sufficient temperature differential within the stack to foster a draft of 1/2 Pascal or more.
- **2**. The vertical stack vent pipe must be PVC of either 3" or 4" diameter.
- **3.** Connect the vertical stack vent pipe to FAD by running a horizontal pipe from the radon vent outlet to a PVC tee placed in the gravel. Position the tee directly beneath where the vertical stack vent pipe run is to go. If the tee branch is not long enough to "stub out" above the basement floor when poured, place a small section of PVC pipe in the tee branch (see Figure 2).

Outlet Positioning for Various Functions











- **4.** Fill the sub-slab space with a 4" layer of gas-permeable material, such as clean gravel.
- **5.** Place a continuous layer of polyethylene sheeting under the entire slab, overlapping at seams, to serve as a soil-gas retarder.
- **6.** After the basement floor has been completed, seal and caulk any openings in the slab and foundation walls, such as drains, sumps, utility entries, cracks and floorwall joints to retard soil-gas entry.
- 7. Install the vertical stack vent pipe run of 3" or 4" PVC pipe, which extends from the tee branch stub out through the roof. Do not use 90° elbows in the vertical stack vent pipe run above the tee. Properly seal and flash the vent outlet at the roof line.
- **8.** All exposed and visible interior radon vent pipes shall be identified with at least one label on each floor level. The label shall read: "Radon Reduction System".
- **9.** Provide for rough-in wiring in the attic area near the vertical stack vent pipe for later installation of the fan and system failure warning device. **This step is required!** Should subsequent tests indicate an elevated radon level in excess of 4 pCi/L, the passive system must be converted to an active system. (See Figure 3)

For Active Systems

- **1.** Follow step 1 for passive systems. For active systems with a fan, a vertical stack vent pipe within the exterior wall is permitted.
- **2.** Follow steps 2 through 8 for passive systems.



Figure 3

Proper installation of FAD in radon-resistant new construction (*passive and active system*).

- **3.** Install a ventilation fan in the attic to convert system from passive to active.
- **4.** Install a system warning device in an easily accessible location.

Contact the United States Environmental Protection Agency and local State Radon Contacts for more specific information on Radon Control.

Form-A-Drain Inspector Guide

CertainTeed's FAD performs multiple purposes: footing form, drainage system and radon reduction system. It is possible that changes in the sequence of inspections may be required. Stone should be placed in the same manner as current practice. Filtercloth should be used in accordance with local codes and practices as required. FAD is the subject of BOCA Research Report #95-37, dated 1995.

- Lineals must be installed with the water intake slots facing toward the gravel, away from the footing.
- **2.** Drainage outlet adapters must be installed with the round adapter positioned at the bottom of the fitting (Figure 1).

- **3.** In situations where only one-sided drainage is accepted, FAD may be used together with wood or aluminum forms. Follow installation instructions to form either the inside or outside with lineals, and use wood or aluminum forms for the opposite side; see page 4.
- 4. In installations using a single outlet fitting for discharge to daylight or sump pit, a minimum of 12 sq. inches of crossover drainage area is required. The function of the crossover is to transfer water from one side of the system to the other. This can be accomplished through the use of one 4" crossover using two outlet fittings. Crossover installations must be level (Figure 2). An alternative to the crossover is to drain the inside system to a sump pit and the outside system to daylight (drainfield).
- 5. The transfer pipe leading to the sump pit or daylight should be 4" in diameter, otherwise, the overall carrying capacity of the system will be affected accordingly.

Figure 1 Outlet Positioning





Types of Crossovers



- **6.** Should lineals become damaged or cracked, repair of lineals can be accomplished through one of the following methods:
 - a crack smaller than slot width: do not attempt to repair, this is insignificant.
 - a crack that might restrict drainage flow or allow stone and dirt to enter: remove small broken piece and cover open area with duct tape prior to backfill.
 - a crack with large opening: cut out the damaged section and replace using a small piece of lineal, which is staked in line using a matching length of lineal. This will not affect the integrity of the drainage system.
 - cover broken area by using a coupling with one side cut out.
- **7.** The FAD system must be installed level.

- **8.** The FAD system must be backfilled with the appropriate gravel or stone in compliance with code requirements.
- 9. As with any foundation drainage system, roof runoff downspouts or rain gutters must not be connected into the system. If required, window well drainage may be drained into gravel or stone adjacent to or hard-connected to FAD via use of a vertical tee, or the use of a downspout adapter.
- 10. Local codes may call for a filter fabric/geotextile screen to be used in conjunction with the foundation drainage system. FAD is available with integral filter fabric; see #40-95-08 for details. Optionally, installation may be done with separate filter fabric; see page 3.



Form-A-Drain Installation Tips

The following pointers/tips are not applicable in every installation situation, but may be useful to speed up installation.



• Do not pre-plan or pre-cut lengths. Simply cut to length when required and use remaining piece for next piece to be installed. This will help minimize waste by ensuring numerous short pieces are not left over. At a corner, cut the lineal to required length, insert into the corner and start around the corner with the piece just cut off. (The "breakeven" on a lineal vs. a coupling is approximately 18".)



• Use of small, fine-thread, drywall screws is recommended as opposed to the course thread or bugle screws. Drywall screws "take" into the lineals better and are easier to snap off. It is not necessary to back out drywall screws when used with forming pins that are pulled. A sharp rap downward and outward will snap the head off the drywall screw, allowing the forming pin to be pulled.



• FAD can be anchored to the footing. Periodically placing a drywall screw partially into the interior side of the lineal will eliminate concern about lineals staying tight against the footing after pouring and prior to backfill.



• Pin the corners in place during setup by driving a rebar stake into the ground through the holes in the corners. This will keep the system aligned and make set-up easier.



• Secure FAD to stakes above the desired elevation. When fastening the lineal using any of the recommended staking methods, elevate lineals slightly above the desired elevation level around the entire system. Then go back around and tap the form back down to desired elevation level.



Create crossovers anywhere in the system by using a standard hole saw with a pilot bit. Cut the holes directly across from one another. Then, either: 1) Insert 2 Outlet Adapters (AD004) and attach appropriate length of corrugated pipe to adapters, OR
2) Insert appropriate length of 2" or 3" PVC pipe with both ends cut at a 45° angle (the angle cut keeps the pipe ends open, not blocking flow into the lineal)

Receiving, Handling and Storing Form-A-Drain

Inspection

All shipments from a CertainTeed plant must be inspected as soon as possible after arrival. All CertainTeed lineal product is shipped in bulk quantities. Extremely rough handling enroute may cause damage. Begin by making an overall inspection of the load. Visual inspection should indicate any apparent damage to the product. DO NOT discard any damaged material. Set this material aside and submit claims for any damage to the trucking company directly. Make a thorough check to ensure every item on the packing list is received. Any shortage must be shown on the signed receipt. Each bunk or carton is marked to indicate the footage, size and type of product, making it easy to check a mixed load. DO NOT throw cartons off the truck; handle all material carefully at all times.

Unloading— Full Truckloads

FAD is designed to withstand normal field conditions, but could be damaged by careless handling. Lineals can easily be unloaded in full bunks using mechanical equipment. Unload only one bunk at a time. Unloading in full bunks is the preferred method since it minimizes potential damage.

Storage

Store lineals on a flat surface and always in a horizontal position. If product is to be stored for a prolonged period, it is recommended that it be left in the original bunk packaging. If product is stored outside, it must be covered with an



opaque material for protection from the sun's rays. Product must be stored away from excessive heat, because PVC material can be temperature sensitive and it therefore can "grow" toward the radiant heat from the sun. To avoid this, complete bunks of lineals must be stored in the horizontal or flat direction, with slotted side down and with equally spaced supports in at least three places, along the 12' length. At the job site, individual pieces must be placed on a flat surface, out of direct sunlight.

Exposure to Excessive Heat

Fittings are provided in cartons that shield the product from direct sunlight. Should fittings be subjected to moderate heat, a slight concave (inward) hourglass effect may occur. This does not affect product performance in any way.

In the case of both lineals and fittings, it is important to avoid storing in a high heat environment. Temperatures above 150°-160°F will result in permanent distortion.

FORM-A-DRAIN

LINEALS	Size	Part #	
	4 <u>" X 12</u> '	LN124	
	6 <u>" X 12</u> '	LN126	
	8" X 12'	LN128	
FILTER FABRIC	Size	Part #	
	4 <u>" X 12</u> '	LF124	
	6 <u>" X 12</u> '	LF126	
	8" X 12'	LF128	
FITTINGS	Size	Part #	
Coupling	4"	XCPL4	
(Extruded)	6"	XCPL6	
	8"	XCPL8	
Coupling	6"	COUP6	
With Hole	8"	COUP8	
	<u> </u>	CN904	
90*	-4	(no noie)	<u></u>
	8"	CN908	
15°	<u> </u>	CN454	
49	 6"	CN456	
	8"	CN458	
	4" X 4"	OUT44	
Outlet	6" X 4"	OUT46	
	8" X 4"	OUT48	
Double	6"	DOF46	
Outlet	8"	DOF48	
Fitting		20110	
Vertical	4"	VL904	
90° "L"	6"	VL906	
	8"	VL908	
Vertical	4"	VTEE4	
"T"	6"	VTEE6	
	8"	VTEE8	
ACCESSORIES	Size	Part #	
Grade	18"	GS018	
Stake	30"	GS030	
Spacer P	4" X 16"	SS416	
Strap 7	4" X 20"	SS420	
	4" X 24"	SS424	
Outlet		AD004	
Adapter ()	or field fat	prication	
of outlet fittings-			
use 3-1/2" hole saw)			



THE OLD WAY



Job #1 Forming Footing



Job #2 Removing Forms



Job #3 Installing Drainage

THE FORM-A-DRAIN WAY



Job #1 Footing and Drainage Installed



Job #2 Footing and Drainage Installed



Job #3 Footing and Drainage Installed

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CertainTeed Corporation Pipe & Plastics Group 750 E. Swedesford Road P.O. Box 860 Valley Forge, PA 19482 Telephone (610) 341-6950 Fax (610) 341-6877 http://www.certainteed.com Create new time to:

- Save money.
- Get work done faster.
- Best of all, generate more revenue.

After FAD, there's no going back.

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