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**Wisconsin**  
Department of Commerce

Evaluation #

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Safety & Buildings Division  
201 West Washington Avenue  
P.O. Box 2658  
Madison, WI 53701-2658

## Wisconsin Building Products Evaluation

Material

Forma-Corr  
Drainage Pipe and Form for  
Walls and Footings

Manufacturer

Drainage Industries  
300 North Lilas Drive  
Appleton, WI 54914

### SCOPE OF EVALUATION

**GENERAL:** The Forma-Corr footing and foundation drainage system, manufactured by Drainage Industries has been evaluated for use as a footing form and foundation drainage system.

**Comm** requirements below in accordance with the current **Wisconsin Uniform Dwelling Code for 1 & 2 family dwellings:**

- **Footings:** The Forma-Corr footing and foundation drainage system was evaluated in accordance with s. **COMM 21.15.**
- **Drain Tiles:** The Form Forma-Corr footing and foundation drainage system was evaluated in accordance with s. **COMM 21.17.**

The **IBC** requirements below in accordance with the current **Wisconsin Amended IBC Code:**

- **Footings and Foundations:** The Forma-Corr footing and foundation drainage system was evaluated in accordance with the general requirements of s. **IBC 1805.1.**
- **Concrete Footings:** The Forma-Corr footing and foundation drainage system was evaluated in accordance with s. **IBC 1805.4.2.**
- **Foundation Drain:** The Forma-Corr footing and foundation drainage system was evaluated in accordance with s. **IBC 1807.4.2.**
- **Drainage Discharge:** The Forma-Corr footing and foundation drainage system was evaluated in accordance with s. **IBC 1807.4.3.**

### DESCRIPTION AND USE

The Forma-Corr drainage pipe is a stay-in-place form for concrete footing construction, and serves as part of the foundation drain system after construction. Forma-Corr is a rectangular shaped corrugated pipe manufactured from

high density Poly Ethylene (HDPE) material. Forma-Corr's exterior dimensional size is 2.542-inches wide by 6.292 inches high, in lengths of 10 feet. The Forma-Corr pipe has 0.500-inch wide by 0.200-inch deep corrugated ribs with drainage slots. Nominal interior dimensions are 2-inch wide by 5.7 inches high. At mid height, a continuous smooth transverse plate connects the two sidewalls to add strength. Wall thickness varies from about 0.02-inches to 0.075-inches. The walls are perforated with slots to permit groundwater to enter the pipe interior.

For typical footing construction, the connection detail for the bleeder (cross-over) connections between the inner and outer Forma Corr drains is as follows: a hole is cut into the Forma Corr using a hole saw and a HDPE adapter is inserted into the hole. The process is repeated on the opposite side of the footing, and a length of corrugated HDPE pipe is connected between the adapters. This connection provides an unobstructed connection between the collector tile and the tile to the sump or outlet. The full area of the adapter is available to conduct groundwater from one side of the footing to the other. This connection offers less resistance to flow than the traditional butt joint connection of drain tiles, which provides only the area of the open joints or perforations.

Accessories and fittings include couplings, 45° and 90° corners, vertical 90° angle pieces for stepped foundations, single and double drain outlets, steel grade stakes, steel spacer/spreader straps, and 2-inch PVC crossover pipe. Spacer straps insure equidistant form setup. Note: **THIS SHALL BE THE MINIMUM REQUIREMENT FOR ACCESSORIES AND FITTINGS WHEN INSTALLING IN THE FIELD.**

### **TESTS AND RESULTS**

The tests and results listed below cover the **Wisconsin Uniform Dwelling Code (UDC), (for 1- and 2-family dwellings)** and the current **Wisconsin Amended 2006 IBC Code** requirements:

The high density Poly Ethylene (HDPE) material used in the Forma-Corr footing and foundation drainage system is in accordance with ASTM F 405-05 "Standard Specification for Corrugated Polyethylene (PE) Pipe and Fittings" and ASTM D 2412-02 "Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading".

Larson Engineering, Inc. prepared hydraulic calculations on the Forma-Corr Drainage Pipe. Hydraulic capacities for the Forma-Corr pipe, at various flow depths and slopes, were calculated using Manning's Equation. The results indicate that the hydraulic capacity of Forma-Corr falls between those of 3 inch round corrugated HDPE pipe and 4 inch round corrugated HDPE pipe. The conveyances for each are shown below:

- 3 inch round corrugated HDPE pipe  $k = 0.77$
- Forma-Corr corrugated HDPE pipe  $k = 1.12$ , and
- 4 inch round corrugated HDPE pipe  $k = 1.65$ .

Thus at a given slope, the Forma-Corr can pass more water than a 3 inch corrugated pipe and less than a 4 inch corrugated pipe.

As a result of the hydraulic calculations, a bleeder spacing of 75 feet is allowed for installation instead of the 8 feet dimension called out in **s. Comm 21.17(3)(d)5**.

Test results are on file with the department.

### **LIMITATIONS OF APPROVAL**

The limitations below are in accordance with the current **Wisconsin Uniform Dwelling Code (UDC), (for 1 & 2 family dwellings)** and the current **Wisconsin Amended ICC Code**:

**GENERAL:** The system **shall** provide drainage for both the inside and outside walls with an integrated and hard-connected drainage network. The interconnected system **shall** provide for the free flow of water from one side of the system to the other. Whether the drain outlet is directed to a pump pit inside the foundation, to a daylight drain outside of the foundation, or to both a sump and an outside outlet, all the water from both sides of the foundation **shall** flow through a single system to the outlet.

**Note: Only Forma-Corr crossovers (bleeders) and connectors provided by Forma-Corr shall be allowed for installation in the drainage system.**

The **Wisconsin Administrative Code** limitations below in accordance with the current **Wisconsin Uniform Dwelling Code for 1 & 2 family dwellings:**

- **Footings:** The Forma-Corr footing and foundation drainage system is approved for use as a footing form when installed in accordance with **s. COMM 21.15**, and in accordance with the manufacturer's installation instructions.
- **Drain Tiles:** The Forma-Corr footing and foundation drainage system used as a foundation drainage system is approved for use in accordance with **s. COMM 21.17 (2)(c), (3)(c) and (e)**.

The Forma-Corr footing and foundation drainage system shall be installed in accordance with **ss. COMM 21.17(3)(d)4., 21.17(3)(d)5., and 21.17(3)(d)6.**, as noted below:

- a) In lieu of **s. COMM 21.17 (3)(d)4.:** The drain tile shall be covered with at least 12 inches of washed rock which meets the following criteria: 1) 90% – 100% of rock must pass a ¾-inch sieve; and 2) 20% - 25% of of rock must pass a 3/8-inch sieve.
- b) Section **COMM 21.17(3)(d)5.:** Crossovers (bleeders) shall be provided to connect the exterior footing drain tile to the interior footing tile. A Forma-Corr 3-inch connector shall be placed in the Forma-Corr footing at 75 feet maximum intervals around the entire footing. In all cases, the crossovers shall be placed at approximately equal distance apart around the entire footing. This allowance for a lower ratio of bleeder area to length of tile is due to the fact that the Forma-Corr footing and foundation drainage system uses a low resistance connector between the bleeder pipe and the Forma-Corr sections as opposed to the code permitted butt connection.
- c) In **s. COMM 21.17 (3)(d)6.:** The drain tiles or pipe which lead from the footing tiles to the sump pit shall be connected to a 4-inch Forma-Corr outlet fitting and laid at a grade of not less than 1/8-inch per foot leading to the sump pit. The remaining drain tiles shall be installed level.

Four-inch crossovers and 4-inch outlets to sumps are to be constructed using 4-inch corrugated drain tile and **MUST** be connected to the Forma-Corr by the 4-inch outlet fittings supplied by the manufacturer. No other connection method is acceptable. Two-inch crossovers shall be installed using a 2-inch PVC pipe or an approved 2-inch drain tile connector. Refer to manufacturer's installation instructions for "Crossover Drainage".

The **IBC** limitations below are in accordance with the current **Wisconsin Amended IBC Code:**

- **Footings and Foundations:** The Forma-Corr footing and foundation drainage system shall be installed in accordance with the general requirements of **s. IBC 1805.1**.
- **Concrete Footings:** The Forma-Corr footing and foundation drainage system shall be installed in accordance with **s. IBC 1805.4**.

This approval will be valid through December 31, 2013, unless manufacturing modifications are made to the product or a re-examination is deemed necessary by the department. The product approval is applicable to projects approved under the current edition of the applicable codes. This approval may be void for project approvals made under future applicable editions. The Wisconsin Building Product Evaluation number must be provided when plans that include this product are submitted for review.

#### **DISCLAIMER**

The department is in no way endorsing or advertising this product. This approval addresses only the specified applications for the product and does not waive any code requirement not specified in this document.

Revision Date:

Approval Date: January 6, 2009 By: \_\_\_\_\_

Lee E. Finley, Jr.  
Product & Material Review  
Integrated Services Bureau

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