National Clay Pipe Manufacturers, Inc.

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CLAY PIPE HEATING, VENTILATING, AND AIR CONDITIONING DUCTS

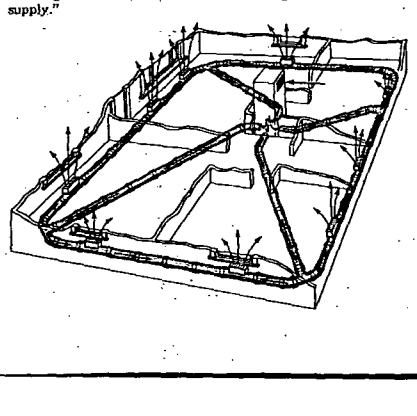
Information contained here *includes* the basic data, needed by engineers, architects, builders, and heating contractors to evaluate and install low-cost Vitrified Clay Heating Ducts in basementless slab-floor homes and other structures. This new development has become so popular that many requests for authoritative information have followed the publication of articles about the new system in the trade press. There are three major reasons for its popularity:

ECONOMY—The complete Clay Pipe installation is economical and efficient. It combines the advantages of radiant heat and controlled warm-air circulation at greatly reduced costs.

SERVICE—Clay Pipe is chemically inert and cannot be eaten away by lime in concrete. It does not rust, corrode, or disintegrate from moisture and furnace gases. It will not crush or deform as concrete is poured over it.

INSTALLATION—Clay Pipe's handy lengths and easy-to-make joints permit fast installation and lower labor costs. A wide variety of fittings is available to solve construction problems with no on-the-job delay, and Clay Pipe cannot float as the concrete is poured.

PERIMETER LOOP SYSTEM—The data and instructions contained here apply to the Perimeter Loop system, since it is more highly recommended by heating authorities. Its pattern eliminates the "waterfall" of cold air at the outer walls and effectively combats "radiant cold" at the outside edges of the slab. It combines the advantages of forced warm-air heating with heat by radiation through the concrete slab. Heat is concentrated where people are sitting—not at the ceiling. In test installations, the new heating method has cut operating costs from 20 to 30 percent by eliminating high heat-loss at ceilings or attics. Successful research conducted by the National Warm Air Heating and Air Conditioning Association has been followed with great interest by the building and heating industries. According to the Association, "Warm Air Perimeter Heating is a highly successful method of heating a basementless building.... It produces the ultimate of occupancy comfort. It is economical to install; can be designed to use a minimum amount of scarce materials; and requires no unusual skill in its design and installation that the heating contractor cannot supply."



The perimeter loop design shown here is used in structures built upon a concrete slab directly on the ground. Its air distribution system includes a warm air duct that extends completely around the perimeter of the building in a continuous loop. The ducts are buried in the slab 2 to 18 inches from its outside edge, and the tops of the bells will be 1½ inches below the slab surface. Heat is delivered into the rooms by warm air discharged from registers placed in the floor beneath the windows, and by radiant heat from the warm floor surfaces over the embedded ducts. The loop is supplied by feeders extending from a plenum chamber in the slab.

ADVANTAGES—It is well known that the greatest heat loss in a well constructed and insulated building—commercial or residential—will be found at the outside walls and glass areas. This loss will usually average 65 percent of the total structural heat loss. Concrete slab floors will account for approximately 18 percent of the total heat loss. The rest of the heat will be lost through the ceiling or attic. Perimeter heating introduces the heat along the outside walls and along the glass area. The heat rises and the resulting blanketing effect reduces the radiant heat loss from all outer walls and windows. Furthermore, this blanketing effect also eliminates air drafts which are caused by the cooling influence of the walls. The heating ducts, embedded in the concrete slab floors, help to maintain the floor surface temperature at desired comfortable levels. It can be seen that perimeter heating accomplishes three important basic functions: first, it replaces the heat that is lost; second, it replaces the heat at the same point where it is lost; and third, it replaces the heat as fast as it is lost. Tests conducted by the *National Warm Air Heating and Air Conditioning Association* at its University of Illinois Research Center and in actual installations throughout the country indicate that temperatures in residential structures can be maintained well within the limits established for comfort conditioning.

VERSATILITY—Clay Pipe heating ducts can also be adapted for ventilation and air conditioning purposes. This is another advantage of the under-slab design—the required amount of ventilation air can be circulated through the same distribution ducts used for heating.

FURNACES—Although a down-flow type of furnace is generally associated with the perimeter warm air heating system when installed in basementless structures, all types of winter air conditioning units can be used. Successful installations have been made using up-flow types of equipment as well as horizontal units. When up-flow furnaces or horizontal suspended units are used, down-comer ducts are used to connect the warm air plenum of the furnace unit with the distribution plenum in the floor. Also, two or more furnaces can be installed—each unit having separate control for its own distribution system so that various sections of the structure can have individual temperature control. However, one unit sized for the entire heat loss can be also installed, using two or more bonnet outlets with automatically controlled dampers in each.

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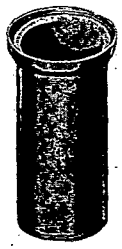
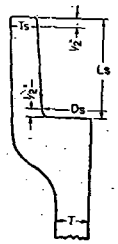
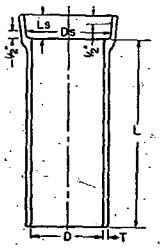
VITRIFIED CLAY PIPE FOR UNDERFLOOR HEATING DUCTS

Conforming to ASTM Specifications C-13







Size, in. (D)	Laying Length (L) Nominal, ft	Laying Length (L) Limit of Minus Variation,* in. per ft of length	Maximum Difference in Length of Two Opposite Sides, in.	Outside Diameter of Barrel, in. Min.	Outside Diameter of Barrel, in. Max.	Inside Diameter of Socket at ½ in. Above Base, in. (Ds) Min.	Inside Diameter of Socket at ½ in. Above Base, in. (Ds) Max.	Depth of Socket, in. (Ls) Nominal	Depth of Socket, in. (Ls) Min.	Thickness of Barrel, in. (T) Nominal	Thickness of Barrel, in. (T) Min.	Thickness of Socket at ½ in. from Outer End, in. (Ts) Nominal	Thickness of Socket at ½ in. from Outer End, in. (Ts) Min.
4	2, 2½, 3	¼	5/16	4 7/8	5 1/8	5 3/4	6 1/8	1 3/4	1 1/4	½	7/16	7/16	3/8
6	2, 2½, 3	½	3/8	7 1/16	7 7/16	8 3/16	8 3/8	2 1/4	2	5/8	9/16	½	7/16
8	2, 2½, 3	¼	7/16	9 1/4	9 3/4	10 1/2	11	2 1/2	2 1/4	3/4	11/16	9/16	½
10	2, 2½, 3	¼	7/16	11 1/4	12	12 3/4	13 1/4	2 5/8	2 3/8	⅞	13/16	5/8	9/16

* There is no limit for plus variation.

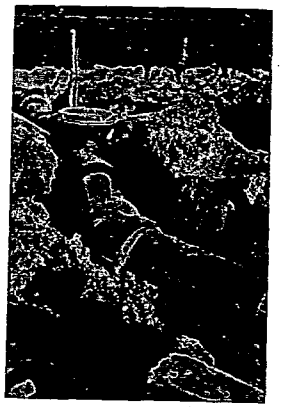
STORAGE—There are no storage problems, because vitrified clay pipe heating ducts can be exposed to weather in any season.

PERFORMANCE IN USE—Clay pipe ducts have such advantages as permanence, resistance to shock loads, and resistance to corrosion from lime in the concrete. They create no odor as warm air flows through them during furnace operation. The smooth inner surface eliminates turbulence and minimizes register noise. The clean smooth surface of the Vitrified Clay Duct is free from dust.

DESIGN DATA—Detailed design recommendations have been prepared by the *National Warm Air Heating and Air Conditioning Association* and are contained in the new revised edition of Manual 4 ($1.50) and Manual 9 ($0.75), which are available from the association's offices, 145 Public Square, Cleveland 14, Ohio. Manual No. 4 describes warm air perimeter heating systems as applied to structures without basements. Manual No. 9 contains detailed information on design and installation of warm air winter air conditioning systems and all necessary engineering data, tables, and recommendations for selection of proper heating equipment.

CASE HISTORIES—For data on actual case histories of Clay Pipe heating, ventilating and air conditioning duct installations in homes, schools, churches, hospitals, factories, gasoline stations, garages, stores, and theatres, write the National Clay Pipe Manufacturers, Inc., 1820 "N" St. N.W., Washington 6, D. C.

DRAINAGE—When planning basementless homes, great care should be taken to select only well-drained sites. Perforated Clay Pipe should be used to drain the building site. The drainage line should be laid around the outside of the footings and connected to an adequate lot-drainage system, in the herring bone, gridiron, or parallel patterns. Pipe with perforations half-way around the barrel provides good drainage yet carries off a minimum of dirt in suspension. For home drainage, Standard Strength (ASTM C-211) Perforated Clay Pipe is recommended.



Large diameter clay pipe heating duct and plenum connection used in commercial structure. This type of duct, when installed in garages and maintenance or repair shops, can be used for heating, ventilating, air conditioning, and removal of exhaust gases. When registers are located under the windows, the warm air will blanket the glass area and eliminate frosted and wet windows.