carload deliveries should be provided for. Local ordinances and the requirements of the *National Board of Fire Underwriters* and the local bureau having jurisdiction should be studied and strictly adhered to, especially in the matter of locating and burying outdoor tanks and in the brick-housing and sand-fill usually required for large interior tanks that are not buried.

Where the storage tank is buried outside the building, the oil suction, oil return and the steam flow and return lines should all be run in one large split tile, carefully cemented. The steam line should then drop into the oil storage tank, either spirally around the suction line, thence returning through the tile, to discharge into the heating system trap, or the coil can extend to and be laid along the bottom of the tank, with the return similarly returning to the steam system. Great care should be exercised in the construction of steam lines inside of oil tanks, so that there will be absolutely no possibility of a leakage from the oil into the steam coils when coils are under a vacuum or of the steam leaking into the oil.

Every tank should be provided with a man-hole and with the following tappings:

4 in. fill	1½ in. return	1½ in. steam flow
3 in. suction	1½ in. vent	1½ in. steam return

All these tappings should be in the top of the tank. The suction pipe should not extend closer than six inches to the bottom of the tank. These tappings can be varied in size to suit local ordinances or conditions.

There are two general types of tanks—vertical steel and horizontal steel. Up to 10,000 gal. the horizontal steel tank is commonly used; the vertical steel tank is used for larger capacities.

Since the minimum car of oil is 8,000 gal., it is well not to plan any tankage of less than 10,000 gal. capacity, where carload deliveries are possible. Where oil companies maintain reserves of oil, smaller storage can be provided for than in districts where all the oil has to be brought in by car. In this case, there should be enough storage for a reasonable period. One ton of coal is equivalent to approximately 140 gal. of fuel oil.

Standard construction for underground horizontal steel tanks provides 3/16 in. steel for up to 4,000 gal., ¼ in. from 4,000 to 10,500, 5/16 in. from 10,500 to 20,000 gal. Vertical above ground tanks should be built in accordance with the Underwriter's tables for diameter and height.

While oil consumption can be fairly accurately checked by gaging the tank, the oil meter is the most logical method of quickly determining fuel costs and in estimating the relation between fuel consumption and work performed.

DOMESTIC OIL HEATING*

Because of the large number of domestic oil heating units that are available, there is considerable confusion as to the relative merits of each burner. Certainly it is important to look into the construction of the burner as to design, workmanship and materials, but a point that should be kept in mind is that the Architect and Engineer is recommending not

*From data prepared by H. F. Tapp, technologist, *American Oil Burner Association.*

only a burner but an installation. The ability of the man making the installation and adjusting the burner to meet the needs of each application should receive careful consideration when making a choice of oil heating equipment. A further consideration in making a choice is the stability of the manufacturer and dealer.

BURNER TYPES AND CHARACTERISTICS

There are two distinct types of oil burners used for oil heating—the natural draft burner and the mechanical draft burner. Their names indicate the manner in which the air for combustion is obtained.

The natural draft burner requires no motor and usually has no moving parts. The air for combustion is supplied by the pull of the chimney and is, therefore, dependent upon the construction of the latter. This type of burner is often incorrectly referred to as a "gravity" type burner. Gravity indicates the manner in which the fuel is fed to the burner and a gravity system is applicable to either natural draft or mechanical draft burners. This type of burner is more sensitive to changes in the weather, wind currents about the chimney and other factors which cause a variation in the draft intensity than is the mechanical draft burner. This variation in draft can be decreased by a well designed chimney and the use of a draft regulator. A natural draft burner is usually limited to small heating loads and for best operation requires the use of lighter oils. It has in its favor a low first cost, simplicity of design, and requires no power for operation.

The mechanical draft burner is motor driven and the air for combustion is supplied by a fan or blower. Generally where a fan is used it is of sufficient capacity to supply the entire amount of air for combustion when the burner is operating at its maximum capacity. Where a blower, either centrifugal or positive pressure, is used, only a portion of the air required is supplied under pressure, the balance being induced by the injector action of the air from the blower plus the natural draft from the chimney. The air from the blower is usually used to aid in the atomization of the fuel. The fan or blower produces a more constant supply of air under varying draft conditions and therefore maintains a uniformly efficient combustion condition.

A second classification of burners used is with reference to the means employed to prepare the fuel for combustion. The terms are vaporizing and atomizing burners.

In the vaporizing burner the fuel is prepared for combustion by the addition of heat. The heat serves to convert the liquid fuel into a vapor which is mixed with the air for combustion either just before or during the combustion process. Blue flame combustion is sometimes advocated but as a blue flame radiates very little heat it is of no particular advantage in a boiler or furnace that has been designed for coal burning, wherein the major heat transfer is through radiation. By vaporizing the fuel, moving parts can be eliminated and it is easy to control at low combustion rates. However it requires a light fuel for best results and with poor design there is the possibility of carbon trouble due to "cracking" or decomposition of the oil in the vaporizing chamber.