The following table gives data from standard authorities on various oils. The flash point varies considerably in the oils from different fields, hence the figures given are subject to variation:

TABLE 79. DATA ON FUEL OILS

OIL	BAUME GRAVITY DEG. FAHR.	FLASH POINT DEG. FAHR.	POUNDS PER GALLON	B.T.U. PER GALLON	B.T.U. PER LB.
Kerosene	42	140	6.80	135,524	19,900
Distillate	38	160	6.96	137,402	19,700
Light Gas Oil	36	190	7.03	138,421	19,700
Dark Gas Oil	32	200	7.21	140,811	19,600
Light Fuel Oil	24	150–200	7.58	145,612	19,000
Heavy Fuel Oil	18	180–280	7.89	149,484	18,900

Note. While the use of an oil may be contemplated, having a cold test sufficient to meet the lowest temperatures experienced, if there is any possibility of higher cold test oils being used, heating coils should be installed in the storage tank.

A fuel oil burner installation comprises oil storage, and pumping equipment, an atomizing assembly and a correctly designed fire-box within the boiler for complete combustion and for proper diversion of the fire and gases. There are certain essential accessories, such as pipe-lines, oil pre-heaters, regulating valves, meters, strainers, pressure gages, relief valves and the proper adaptation of them all to the particular needs of each specific case.

Adequate oil storage should be planned. Where trackage is available, 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 back 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
3 in. suction
1½ in. return
1½ in. vent
1½ in. steam flow
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 three general types of tanks—vertical steel, horizontal steel or concrete. Up to 10,000 gal. the horizontal steel tank is commonly used; the vertical steel tank is used for larger capacities; although the concrete tank is gaining very much in popularity, because of its durability, economical installation cost and the readiness with which concrete may be shaped to fit any space available for storage.

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 170 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.

It is not the purpose of this article to discuss the relative merits of various types of burners. The respective claims of burner manufacturers can be carefully weighed and a decision made as to which is best adapted to the work in question. Mechanical simplicity and the assurance of correct principles of atomization should be of foremost consideration in judging burners.

The decision as to the burner will govern the type of oil pump utilized to draw the oil from the storage tank and introduce it into the burners. The various burner campanies have provided what they consider the most suitable pumping devices for their equipment.

One of the most important phases of oil burner installations, is the design of the combustion chamber of the boiler or furnace. While the consumption of coal is limited in a boiler, by the square feet of grate and the draft available where handfiring is utilized, with oil burning equipment, the only limit to the oil consumption, is in the cubical contents of the combustion chamber or fire-pot. Practically any of the boilers that are in use today are adaptable to oil burning equipment but there should be a rearrangement of the combustion chamber. The grates may be removed, and the burner dropped below their level thus enlarging the combustion space.

The introduction of secondary, heated air is quite important to best combustion results and it is, therefore, customary for brick walls to be built on either side of the fire-box of the boiler to support 2½ × 2½ × ⅜ in. tee-irons laid crosswise, upon which a checker hearth of firebrick is laid. The spaces in this hearth should vary, dependent upon the individual draft and conditions of the heating plant. Air is drawn in