

of drawing the red coals toward the front end and piling fresh fuel toward the back of the fire-box.

Pea size coal requires a strong draft and therefore the best results generally will be obtained by keeping the choke damper open and regulating solely by means of the cold air check and the air inlet damper.

Buckwheat size coal for best results requires more attention than pea size coal, and in addition the smaller size of the fuel makes it more difficult to burn on ordinary grates. Greater care must be taken in shaking the grates than with the pea coal on account of the danger of the fuel falling through the grate. In house heating furnaces the coal should be fired lightly and more frequently than pea coal. When banking a buckwheat coal fire it is advisable after coaling to expose a small spot of hot fire by putting a straight poker down through the bed of fresh coal. This will serve to ignite the gas that will be distilled from the fresh coal and prevent delayed ignition within the fire-pot, which in some cases, depending upon the thickness of the bed of fresh coal, is severe enough to blow open the doors and dampers of the furnace. Where frequent attention can be given and care exercised in manipulation of the grates this fuel can be burned satisfactorily without the aid of any special equipment.

In general it will be found more satisfactory with buckwheat coal to maintain a uniform heat output and consequently to keep the system warm all the time, rather than to allow the system to cool off at times and then to attempt to burn the fuel at a high rate while warming up. A uniform low fire will minimize the clinker formation and keep the clinker in an easily broken up condition so that it readily can be shaken through the grate.

Forced draft and small mesh grates are frequently used for burning buckwheat anthracite. For greater convenience, domestic stokers are used.

Buckwheat anthracite No. 2, or rice size, is used principally in stokers of the domestic, commercial and industrial type. No. 3 buckwheat anthracite, or barley, has no application in domestic heating.

Standard anthracite sizing specifications are shown in Table 6⁴.

TABLE 6. STANDARD ANTHRACITE SIZING SPECIFICATIONS

SIZE	TEST MESH, IN.		ROUND MESH			MAXIMUM IMPURITIES, PER CENT	
	Through	Over	Oversize		Undersize	Slate*	Bone
			Max. Per Cent	Max. Per Cent	Min. Per Cent		
Broken.....	4 $\frac{3}{8}$	3 $\frac{1}{4}$	-----	15	7 $\frac{1}{2}$	1 $\frac{1}{2}$	2
Egg.....	3 $\frac{1}{4}$ to 3	2 $\frac{1}{16}$	5	15	7 $\frac{1}{2}$	1 $\frac{1}{2}$	2
Stove.....	2 $\frac{1}{16}$	1 $\frac{5}{8}$	7 $\frac{1}{2}$	12 $\frac{1}{2}$	7 $\frac{1}{2}$	2	3
Nut.....	1 $\frac{5}{8}$	1 $\frac{3}{16}$	7 $\frac{1}{2}$	10	5	3	4
Pea.....	1 $\frac{3}{16}$	$\frac{9}{16}$	10	15	7 $\frac{1}{2}$	4	5
Buckwheat.....	$\frac{9}{16}$	$\frac{3}{16}$	10	15	7 $\frac{1}{2}$	12 Ash	
Rice.....	$\frac{9}{16}$	$\frac{3}{16}$	10	15	7 $\frac{1}{2}$	13 Ash	
Barley.....	$\frac{3}{16}$	$\frac{3}{32}$	10	20	10	-----	

*When slate content on Broken to Pea inclusive is less than above standards, bone content may be correspondingly increased, but slate content specified above shall not be exceeded in any event and the total maximum impurities shall not exceed those above specified.

⁴Approved and adopted by Anthracite Committee, State Street Building, Harrisburg, Pa.

FIRING METHODS FOR BITUMINOUS COAL

A commonly recommended procedure for firing domestic heating units, called the side-bank method, requires the movement of live coals to one side or the back of the grate, and placing the fresh fuel charge on the opposite side. The results are a more uniform release of volatile gases, and the subjection of these gases to the high temperature of the red coals. If the fresh charge is covered with a layer of fine coal, still better results may be obtained because of slower release of volatile matter.

Bituminous coal should never be fired over the entire fuel bed at one time. A portion of the glowing fuel should always be left exposed to ignite the gases leaving the fresh charge.

The importance of firing bituminous coal in small quantities at short intervals is discussed in a U. S. Bureau of Mines technical paper⁵. Better combustion is obtained by this method in that the fuel supply is maintained more nearly proportional to the air supply.

If the coal is of the caking kind the fresh charge will fuse into one solid mass which can be broken up with the stoking bar and leveled from 20 min to one hour after firing, depending on the temperature of the fire-box. Care should be exercised when stoking not to bring the bar up to the surface of the fuel as this will tend to bring ash into the high temperature zone at the top of the fire, where it will melt and form clinker. The stoking bar should be kept as near the grate as possible and should be raised only enough to break up the fuel. With fuels requiring stoking it may not be necessary to shake the grates, as the ash is usually dislodged during stoking.

It is acknowledged that it may be difficult to apply the outlined methods to domestic heating boilers of small size, especially when frequent attendance is impractical. The adherence to these methods insofar as practical, however, will result in better combustion.

The output obtained from any heater with bituminous coal will usually exceed that obtained with anthracite, since bituminous coal burns more rapidly than anthracite and with less draft. Bituminous coal, however, will usually require frequent attention to the fuel bed.

FIRING METHODS FOR SEMI-BITUMINOUS COAL

The *Pocahontas Operators' Association* recommends the central cone method of firing, in which the coal is heaped on to the center of the bed forming a cone, the top of which should be level with the middle of the firing door. This allows the larger lumps to fall to the sides, and the fines to remain in the center and be coked. The poking should be limited to breaking down the coke without stirring, and to gently rocking the grates. It is recommended that the slides in the firing door be kept closed, as the thinner fuel bed around the sides allows enough air to get through.

FIRING METHODS FOR COKE

Coke ignites less readily than bituminous coal and more readily than anthracite and burns rapidly with little draft. In order to control the air admitted to the fuel it is very important that all openings or leaks into the ashpit be closed tightly. A coke fire responds rapidly to the opening of the dampers. This is an advantage in warming up the system, but it also makes it necessary to watch the dampers more closely in order to

⁵Loc. Cit. Note 1.