IMPORTANT

DRAFT - WHEN INSTALLING WAYNE POWER GAS BURNERS IN OIL FIRED BOILERS A NEGATIVE DRAFT OVER FIRE MUST BE MAINTAINED.

REFER TO YOUR LOCAL GAS COMPANY AND CODES FOR ASSISTANCE.

FOR GAS FIRED EQUIPMENT REQUIRING A DOUBLE ACTING BAROMETRIC THE PREFERRED LOCATION OF THE BAROMETRIC DRAFT CONTROL IS PART OF THE BULLHEAD TEE SHOWN IN FIGURES A, B OR C. DURING NORMAL OPERATION, FLUE GASES MAKE A RIGHT ANGLE TURN BEHIND THE CONTROL, BUT DO NOT IMPINGE UPON IT. SHOULD A DOWNDRAFT OCCUR, AIR FLOWING IN THE OPPOSITE DIRECTION STRIKES THE CONTROL DIRECTLY, CAUSING IT TO OPEN OUTWARDLY AND VENTS THE AIR INTO THE ROOM WITH A MINIMUM OF RESISTANCE. ENTRAINED PRODUCTS OF COMBUSTION ARE THUS PROVIDED GREATER RELIEF.

BEST LOCATIONS FOR GAS

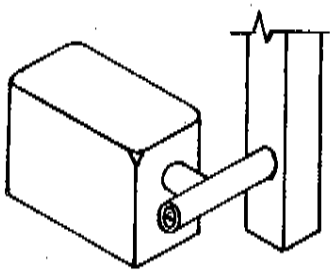

FIG. A

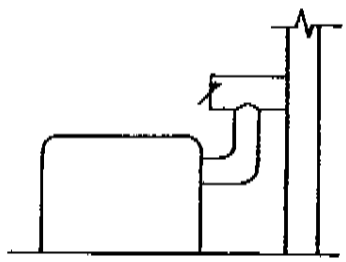

FIG. B

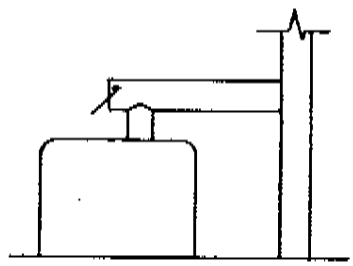

FIG. C

It is recommended that Table Fig. 5 be used in determining the size pipe to use from the meter to the burner.

Table of Pipe Lengths and Sizes								
Size	8'	20'	30'	40'	60'	80'	100'	200'
1/2	100	69	53					
3/4	195	155	120	105	86	68	50	
1				210	180	150	135	75
1 1/4							230	165

Capacity — Cu Ft Per Hr with a 0.6 Sp Gr Gas and Pressure Drop of 0.3" Water Column

Figure 5

To obtain the cubic feet per hour of gas required by the burner, divide the B.T.U. input at which the burner was adjusted by the average B.T.U. heating valve of the gas being used.

The building structure should not be weakened by installation of the gas piping. The piping should not be supported by other piping, but should be firmly supported with pipe hooks, straps, bands or hangers. Butt or Lap welded pipe should not be bent. Fittings should be used at all turns.

The gas piping should be so installed as to prevent an accumulation of condensation and it must be protected against freezing. A horizontal pipe should be pitched so that it grades toward the meter and is free from sags. The pipe should not be run through or in an air duct or clothes chute.

TESTING PIPING FOR LEAKS

Before turning gas under pressure into the piping, all openings from which gas can escape including all pilot burners should be closed.

Immediately after turning gas under pressure into the piping, the system should be checked to ascertain that no gas is escaping. This can be done by carefully watching the 1/2 cubic foot test dial (a small dial usually above the regular dials) to determine if gas is passing through the meter. To assist in observing any movement of the dial hand, wet a small piece of paper and paste its edge directly over the center of the hand as soon as the gas is turned on. Allow five minutes for the 1/2 foot dial to show any movement. If a larger dial is used, allow a proportionate longer time.

In case the test hand shows any movement, the meter cock should be turned off and the necessary repairs made, after which the above test should be repeated.

Defective pipes or fittings should be replaced and not repaired. Never use flame or fire in any form to locate leaks — use a soap solution.

Before pronouncing the piping system gas tight, check the test dials by turning on and lighting a small burner to see that the dial hand moves with the burner on. If the hand does not move with the burner on, the meter should be replaced.

After the piping and meter have been checked, all piping and appliances receiving gas through the meter should be completely purged of air.

CAUTION: Do not bleed the air inside the furnace. Be sure to re-light the pilots on all other appliances connected to the meter.

PREPARATION OF COMBUSTION CHAMBER

The power gas burner is designed for "inshot" firing into a refractory lined combustion chamber constructed in the ashpit of any boiler or furnace originally designed for coal or oil firing. The size, shape and construction of the chamber should be given such consideration as will result in the maximum efficiency of each installation.

On smaller inputs precast chambers may be used if the firing door and ash pit door are large enough to insert the chambers and assemble.

When converting oil designed boilers and furnaces, it is recommended that the same combustion chamber be used with the gas burner. If the blast tube opening into the combustion chamber is larger than 4" diameter, high temperature cement should be used to reduce the opening to a 4" diameter.

IN NO CASE SHOULD THE TUBE BE ALLOWED TO EXTEND INTO THE CHAMBER PROPER: IT MUST BE SET AT LEAST 1/2" SHORT OF THE INSIDE SURFACE OF THE COMBUSTION CHAMBER.

COMBUSTION CHAMBERS

Approved insulating bricks are: Babcock & Wilcox No. K-23 and No. K26, A. P. Green No. G-23 and No. G-26, Armstrong Cork No. A-23 and No. A-26 and Johns Manville No. JM-23 and No. JM-26.

Input BTU/Hr	Floor Area Sq. Inches	Preferred Width and Length	Recommended Minimum Wall Thickness	Recommended Minimum Floor Construction
65,000	63	7 x 9	2-1/2" insulating firebrick plus back up of 1-1/2" or more loose insulation	2-1/2" insulating firebrick plus 1/2 asbestos or magnesia block
75,000	71 1/4	7 1/2 x 9 1/2		
100,000	180	12 x 15		
150,000	200	12 x 16		
200,000	220	13 x 17		

Figure 6

The combustion chamber sizes given in Fig. 6 are based on the maximum rated BTU capacity. If the input is to be permanently set at a reduced rate the combustion chamber floor area can be reduced proportionately to the proposed input, allowing 200,000 BTU per square foot of combustion chamber floor area and proportioning the length about 70% greater than the width.

The height of the walls of the combustion chamber is generally determined by the grate line. The side and front walls should be built about 2" above the grate line, covering the grate lugs and covering the bases of the water legs of boilers by about 3" or 4" to avoid heating sections that may be filled with sediment. The back wall should be carried one to two courses higher and overhung to deflect hot gases from direct impingement on the rear heat exchanger surfaces. Hard firebrick should be used for the overhung section to prevent erosion of the brick at this point by the high velocity gases moving over it.

The remaining open spaces between the combustion chamber and ashpit walls should be filled with loose insulation. Since this insulation may not stand combustion chamber temperatures, the top course of the combustion chamber walls should be laid flat, extending to, and fitting, the contour of the firebox and covering the loose insulation.

Always use cement furnished by the brick manufacturer for cementing insulating firebrick. It should be thinned to the consistency of a very thick cream so that the brick can be dipped into it and set in place. The use of other cement or mortar may impair the insulating and radiating qualities of the brick.

Asbestos or magnesia block insulation, common brick, hard fire brick, dry sand and/or expanded mica products such as "Vermiculite" or "Zonolite" can be used to back up the insulating firebrick. Asbestos cement or a cement made of a mixture of Portland cement and shredded asbestos can be used to seal the openings around the burner, clinker door, etc.

ADJUSTMENT OF BURNER

After the piping has been thoroughly purged of air, the burner should be put into operation. Refer to instructions on plate attached to burner.

Adjust the blower air shutter to provide a long, soft, quiet flame. The local gas company should be consulted for proper carbon dioxide adjustment.

CAUTION: Thoroughly instruct the customer how to properly and safely operate the burner. Also warn customer to be sure to keep all air registers or radiators open. The gas company should be notified of the installation immediately.

should show it to be substantially empty of water. Where there is an existing water temperature limiting switch, its operating and electrical characteristic should be checked to determine its suitability to the gas control circuit. For common piping systems reference can be made to the American Society of Heating and Ventilating Engineers' - Heating, Ventilating, and Air Conditioning Guide and to the Institute of Boiler and Radiator Manufacturers' (IBR) Guides.

Steam or Vapor Systems

The system should be pressure tight, with pressure gauge and pop safety valve in good condition and with an existing water glass which permits clear observation of boiler water level. Where there is a pressure limit switch or a low-water cut-off, inspection should determine whether either device can be utilized in the gas burner control circuit. Reference should be made to the A.S.H.V.E. and I.B.R. guides. Traps and air vents should be of adequate capacity, in good condition, and correctly placed in the system. (Coal firing tends to maintain a slight but continuous steam pressure which prevents air from being drawn back into the steam system. Intermittent gas burner operation and resultant intermittent steam supply usually introduces the need for repurging the system of air each time the boiler is steamed if satisfactory heat distribution is to be achieved.)

NOTE: Copies of the A.S.H.V.E. guides may be purchased from the American Society of Heating and Ventilating Engineers, 51 Madison Ave., New York 10, N.Y. Copies of the I.B.R. guides may be purchased from The Institute of Boiler and Radiator Mfgs., 60 East 42nd Street, New York 17, N.Y.

Flue Pipe and Chimney

The flue pipe should be carefully examined and replaced if deemed necessary in connection with installation of a draft hood.

The flue pipe entrance into the chimney should be at least two feet above the clean-out opening of the chimney.

The chimney should extend high enough above the dwelling or other neighboring obstructions so that wind from any direction will not strike the chimney from an angle above horizontal. Unless the obstruction is of great magnitude, it is the usual experience that a chimney extending at least two feet above flat roofs or above fire-wall parapets, and peaked roofs within 30 feet, will be reasonably free of downdrafts.

Where the chimney is unlined or where local experience indicates that flue gas condensate might be a problem, the local gas company should be consulted.

INSPECTION OF HEATING APPLIANCE

A careful inspection of furnace or boiler should be made. If cracked heating sections, leaking soft plugs or any other condition which might make the unit unsatisfactory for gas conversion is found, proper arrangements should be made for replacement or repair before proceeding with the burner installation. Cracked heating sections should be replaced.

PREPARATION OF FURNACE OR BOILER

Clean combustion chamber thoroughly. Scrape and brush all heating surfaces and flue ways. Soot and fly ash are excellent insulators and unless removed the efficiency of the heating plant will be impaired. Plugged or restricted flue passages will prevent burner from operating properly.

Be sure water column and gauge glass on boiler is clean and water level is visible. In all cases make sure the pigtail to limit control is clear. Safety pop valves on steam boilers and automatic relief valves on closed water systems should be thoroughly checked to make sure they are in good working condition.

Flue Pipe and Draft Hood

An A.G.A. type draft hood or its equivalent shall be placed in and made part of the flue pipe from the appliance. At no time should the draft hood be located at a point lower than the highest flue passage in the appliance. The draft hood should be installed in the position for which it was designed and in no case installed in a false ceiling, separate room from the heating system, or in any other manner that will permit a difference in pressure between the draft hood relief opening and the combustion air supply. On sealed type appliances where all combustion air is taken from the outside, a cap should be installed on end of flue pipe to prevent back drafts. In such cases no draft hood or diverter should be installed inside.

When converting oil fired appliances the flue pipe and draft hood or diverter used should be the same size as the furnace flue collar. It is recommended that a rise as great as possible or at least 1/4 inch to the foot (horizontal length) be maintained in the flue pipe from the appliance to the chimney. The flue pipe should be relocated, where possible, to avoid sharp turns.

DRAFT HOOD & FLUE PIPE SIZES FOR GAS CONVERSION BURNERS IN UP-DRAFT COAL FURNACES AND BOILERS

Not more than 6500 Btu per square inch of flue area

Input - Btu Per Hour	Draft Hood and Flue Pipe Size
Up to 120,000	5 inch
120,000 --- 180,000	6 inch
180,000 --- 250,000	7 inch

Note: If the flue pipe exceeds 10 ft. in length, or contains more than two elbows, use next size larger pipe and draft hood.

NO MOVABLE FLUE PIPE DAMPER SHOULD BE USED ON ANY INSTALLATION.

Revertible Flue (Down Draft or Diving Flue Type) Furnaces or Boilers

When installing the burner in the above type furnaces or boilers, the draft hood (or draft diverter) should be located at least one foot higher than the top of the highest point of the appliance flue passage or combustion chamber. It is also recommended that a vent pipe, not less than one inch in diameter, be provided from the highest point in the flue passage, directly to the flue pipe. This vent is not necessary on appliances with built-in updraft bypass. (See Fig. 2). The gas company serving the area should be consulted in regards to their recommendations for converting this type of furnace or boiler.

The flue pipe should be securely supported and the joints fastened with sheet metal screws or riveted to prevent sagging, and in no case should it be located in a manner that it will present a hazard to combustible building material. (Refer to Local Building Code).

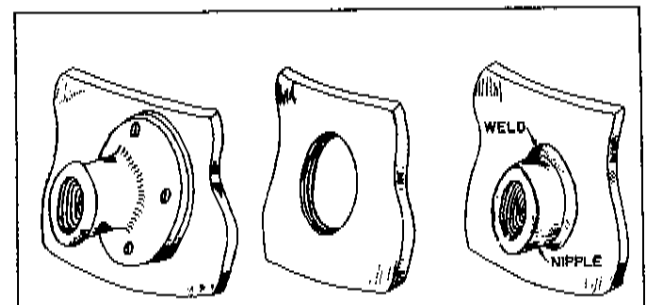

Figure 2

CHIMNEYS

The chimney should be examined and thoroughly cleaned, if necessary, before installation is made to make sure it will freely conduct the flue gases to the outside.

Flue pipe should extend through the chimney wall to inner face of chimney liner but not beyond, and should be