

SERIES 650 MILLS WATER-TUBE BOILER

COMBUSTION CHAMBER ASSEMBLY INSTRUCTIONS

**STEAM OR WATER HEATING
FOR AUTOMATIC FIRING WITH OIL OR GAS**

**IMPORTANT: PROVIDE MINIMUM 6" HIGH CONCRETE
BOILER PAD FOR INDUSTRIAL COMBUSTION D-145
AND D-175 BURNERS – 18 THRU 25 SECTIONS.
FOR LOW NOX BURNERS SEE FIGURE 15 FOR
CORRECT PAD HEIGHTS**

NOTE: DO NOT EXTEND THE CONCRETE PAD UNDER THE BURNER.

TO STEAMFITTER

**NOTE: READ THESE INSTRUCTIONS CAREFULLY.
THEY WILL SAVE YOU TIME IN ASSEMBLING
BOILER PROPERLY.**

**IMPORTANT: BE SURE AND SEAL ALL JOINTS TO
PREVENT AIR LEAKAGE INTO COMBUSTION
CHAMBER.**

THESE INSTRUCTIONS TO BE LEFT WITH THE BOILER FOR REFERENCE PURPOSES.

Smith
CAST IRON BOILERS

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SERIES 650 COMBUSTION CHAMBER ASSEMBLY INSTRUCTIONS

GENERAL INFORMATION

See figures No. 1 thru 15. Also study schedule on page 7 for parts used in the chamber.

The boiler sections should be completely erected with header nipples made up tight into the sections and with locknuts tightened before the installation of the combustion chamber is begun. Remove erecting bars and work through the front opening. Be sure the upper and lower section straps are bolted securely. Study the schedule of insulating block, insulating brick and refractory brick carefully. The blocks and bricks must be located properly in order to fit into the boiler. The schedules and drawings must be used to install the material according to instructions.

BLOCK INSULATION AND REFRACTORY

1. Place side wall and back wall insulation blocks in position. See figures No. 1, 2, 6, & 9.

2. As first course of insulation blocks are placed along side walls, seal space between top of blocks and bottom of sections with insulating cement. Place two lengths of rope on top of 3rd

thickness of insulation block between back sections and seal with insulating cement.

3. Place fire brick against back wall insulation, side wall insulation, and across front of boiler using the bricks of 3" height. See figure No. 3.

4. Place insulation brick in center of fire brick border as shown in figure No. 4. See schedule on page 7.

5. Place five (5) 12 x 6 x 4 foot bricks across the back of boiler. See figure No. 7. Place the rest of the foot bricks along both sides of the boiler. Note that the notched corners of the bricks are placed against the side and back insulation blocks. See figures No. 1 & 7.

6. Place fire brick on top of insulation brick per figure No. 5. This completes laying the floor brick.

7. Place 6 of the 9 x 4-1/2 x 2-1/2 fire bricks against the back foot bricks as shown in figures No. 6 & 7.

FIGURE 1

VIEW THRU SECTION OF COMBUSTION CHAMBER

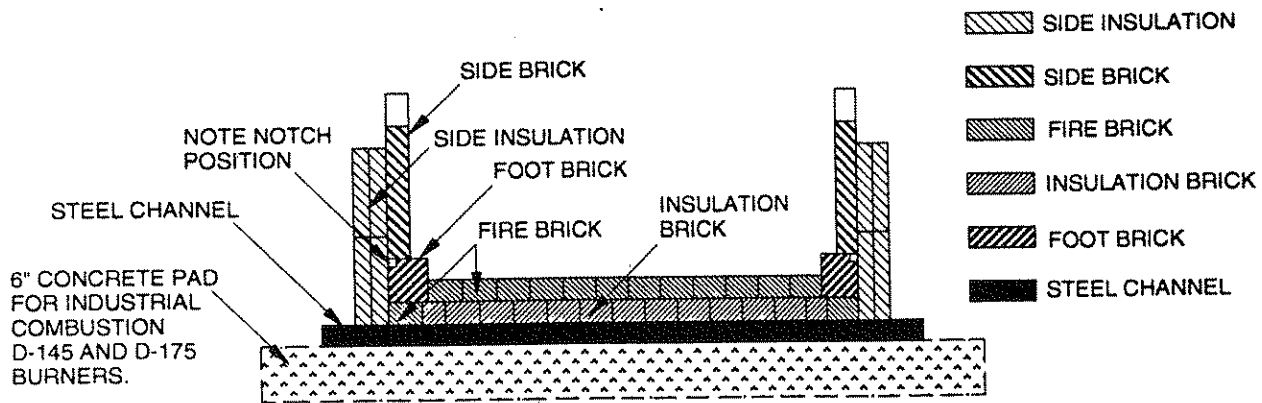
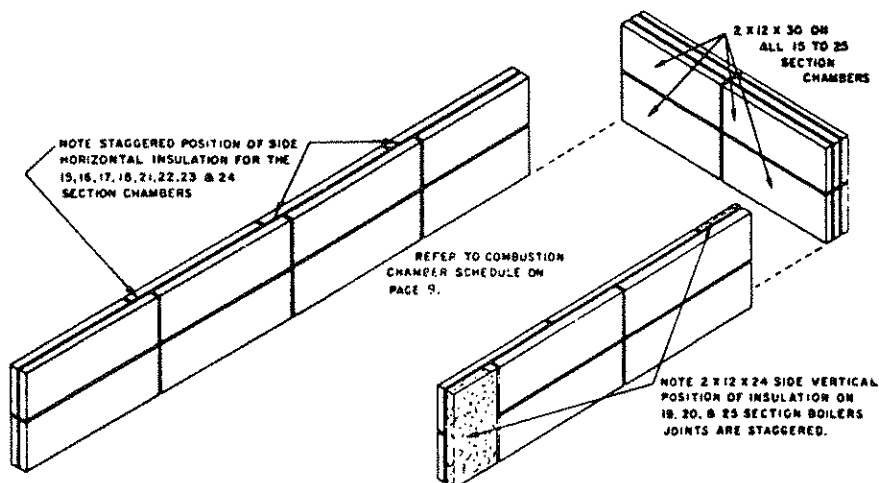


FIGURE 2

ILLUSTRATION OF SIDE WALL AND BACK WALL INSULATION ASSEMBLY



SERIES 650 COMBUSTION CHAMBER ASSEMBLY INSTRUCTIONS

FIGURE 3
ILLUSTRATION OF
BASE COURSE
FIRE BRICK

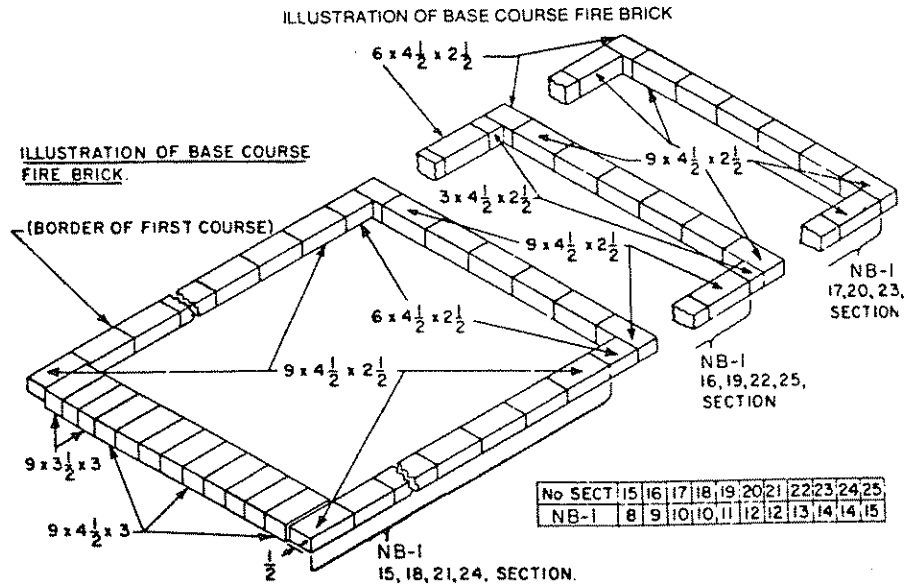


FIGURE 4
ILLUSTRATION OF
BASE COURSE,
OF INSULATION BRICK

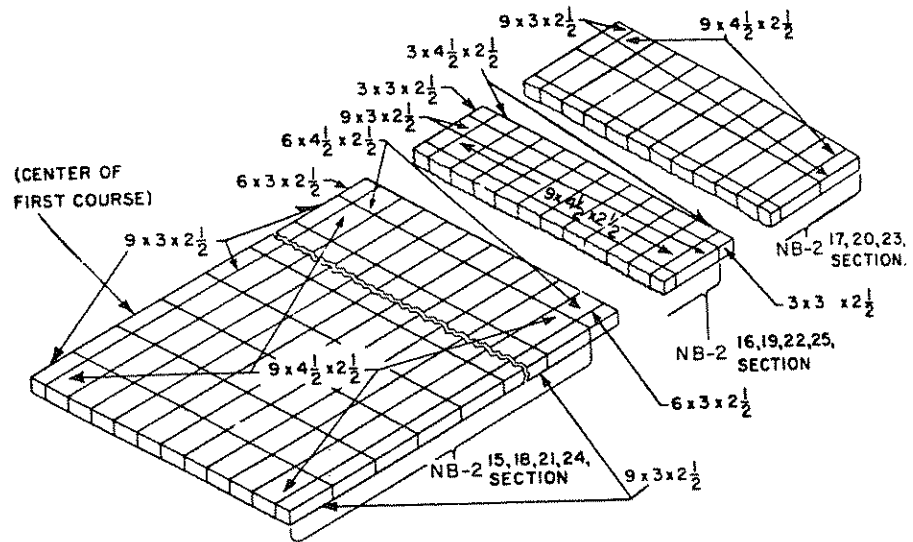
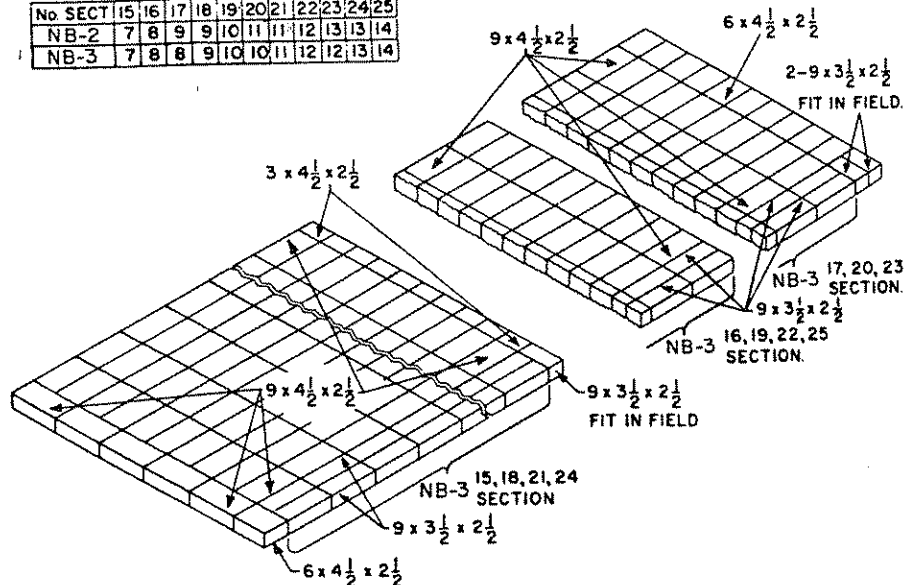


FIGURE 5
ILLUSTRATION OF
TOP COURSE
FIRE BRICK
ON TOP OF
INSULATING BRICK



SERIES 650 COMBUSTION CHAMBER ASSEMBLY INSTRUCTIONS

FIGURE 6

COMBUSTION CHAMBER INSTALLATION FOR 18 SECTION BOILER

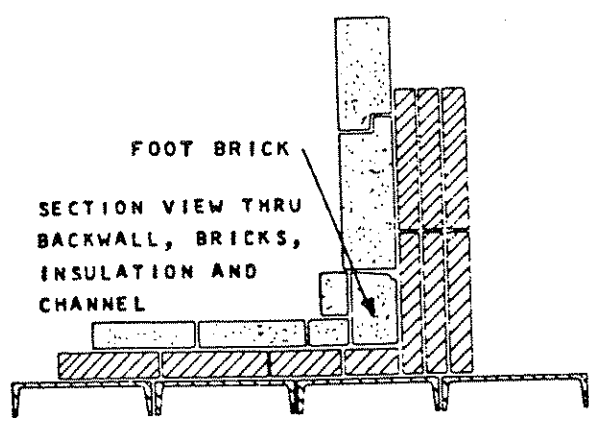
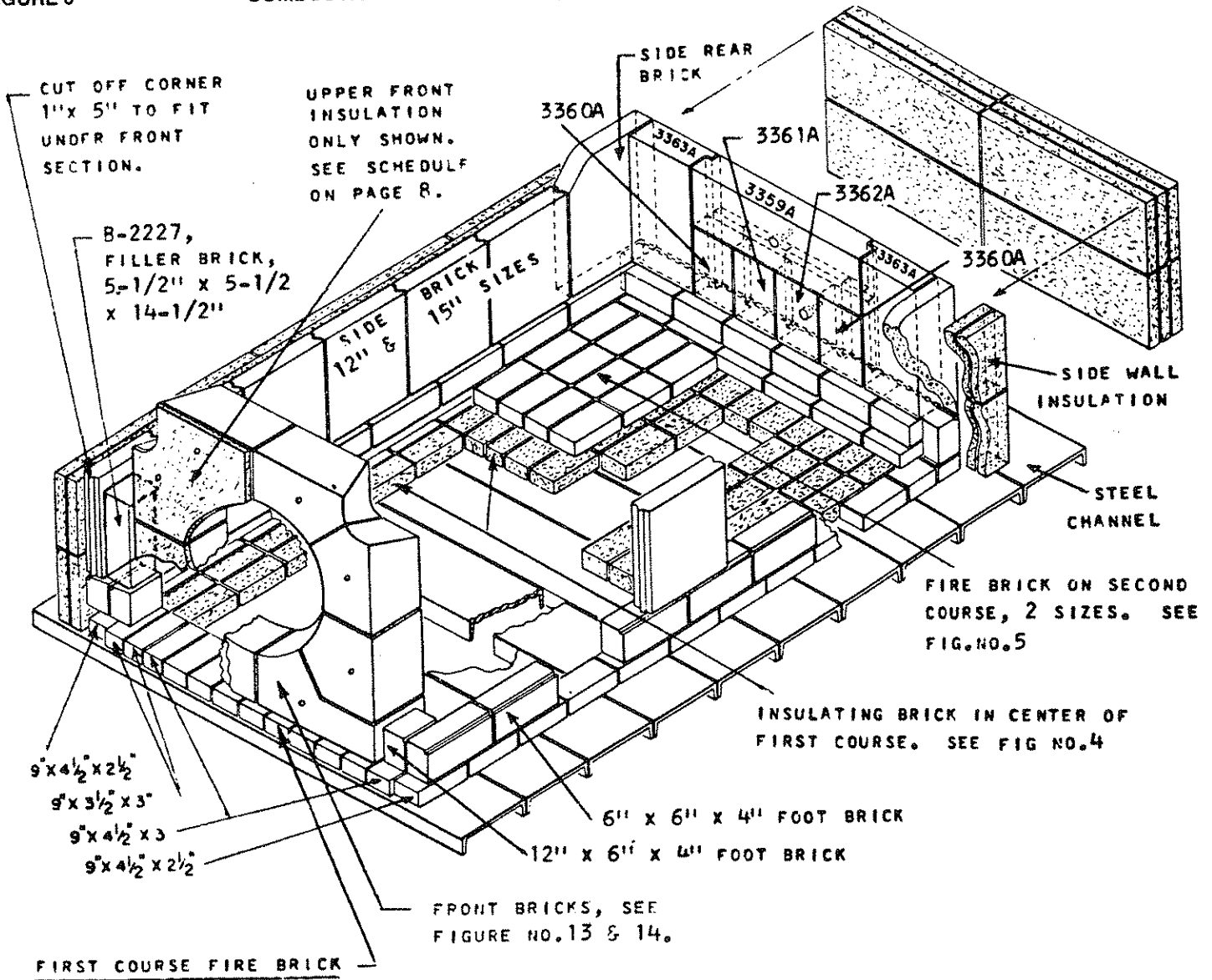


FIGURE 7
SIDE VIEW

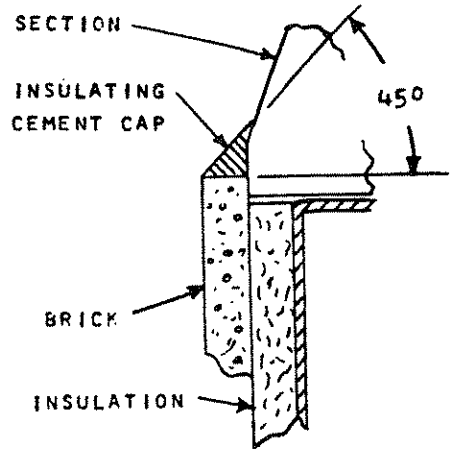


FIGURE 8
ILLUSTRATION OF CAPPING TOP WALLS OF BRICK & SECTION

SERIES 650 COMBUSTION CHAMBER ASSEMBLY INSTRUCTIONS

8. Place one 3363A back corner brick in R.H. corner and one in L.H. corner against insulation as illustrated. Place one 3360A back support brick in L.H. back corner. Place 3361A L.H. center back brick in position. Before placing 3362A R.H. center back brick in position, see figure No. 9 and cement 4-1/2" bolt, washers and nut in hole as shown for use as a handle. Cut hole in insulation for handle fit. The remaining 3360A back support brick is then placed in the R.H. corner. The lintel brick 3395A is placed upon the back R.H. corner. See figure No. 9, 10, & 11 illustrating the assembly of the 9" length rod, plain washer and hex nut. The 9" length rod fits between the back sections.

10. See figure No. 8 showing the placing of insulating cement on the top of side and back combustion bricks, cap the top of bricks at 45°.

IMPORTANT

11. At this stage, place the eight (8) front bricks inside of the boiler near the front of the chamber. Position the bricks on the floor so the bottom bricks are toward the boiler front. Also, place the front insulation boards near the front area for assembly behind the steel front plate. See figures No. 6, 13 & 14.

9. Refer to the combustion chamber schedule on page 7 for the side bricks to be installed against side insulation on each side of boiler.

FIGURE 9
ILLUSTRATION OF
BRICK WALL
AND BACK BRICK
INSTALLATION

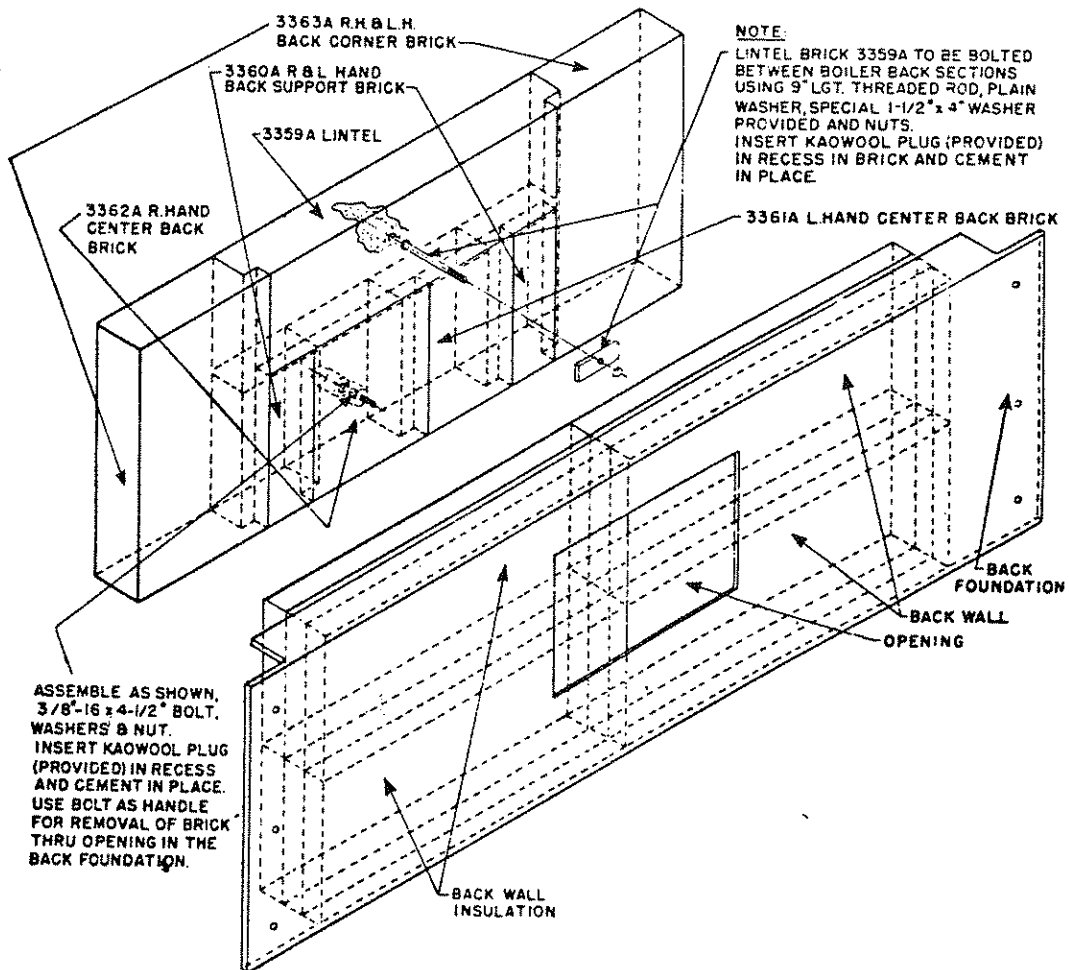
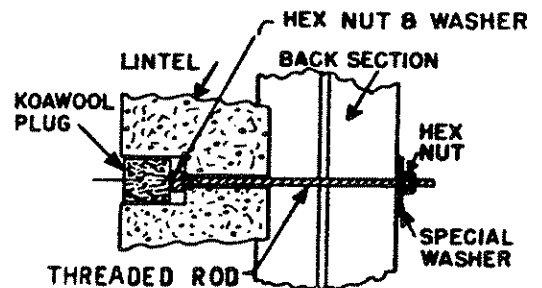


FIGURE 10
SECTION VIEW
THRU LINTEL BRICK
TO REAR OF BACK SECTION



SERIES 650 COMBUSTION CHAMBER ASSEMBLY INSTRUCTIONS

REAR ACCESS DOOR INSTRUCTIONS

1. Remove rear access door (not illustrated) and then cut away the insulation to reach the back center bricks.
2. Remove the 3362A R.H. back brick first using bolt as handle. Draw out through opening in the back foundation. **The R.H. back brick must be removed first.**
3. Remove 3361A L.H. back brick. Use care while removing

back center bricks to avoid tipping the lintel brick, which is supported by the R. & L. hand back support bricks.

4. When the back center bricks are replaced the 3361A L.H. center brick must be placed in position first.
5. Replace insulation and seal joints.

FRONT PLATE

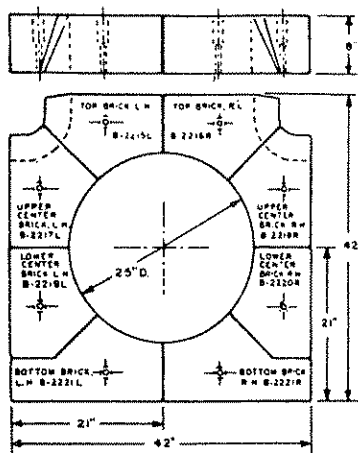
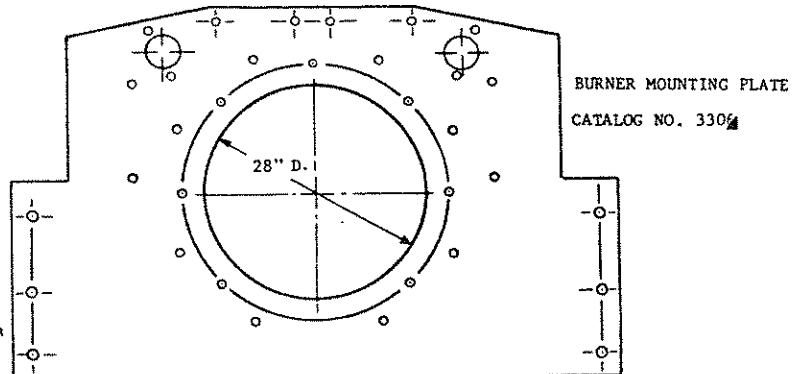
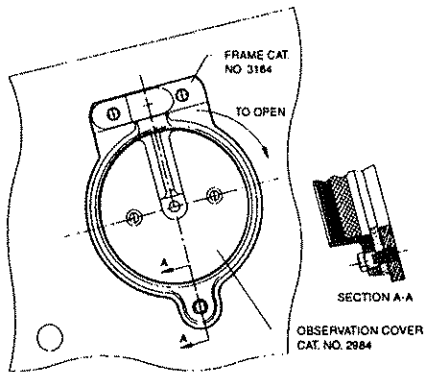
1. Front plate fits over front strap so it is necessary to remove nuts from strap studs. **Do not remove strap or studs.**
2. Assemble six (6) 7/16 - 14 x 2-1/2 steel studs to front section. Trowel a thin, smooth layer of black furnace cement on the front ends of the foundation side wall and on beads of front section.
3. Place the front plate in position over the steel studs. Assemble front plate to side wall using bolts from erecting bars. Assemble washers and hex steel nuts to steel studs and tighten all hardware.

4. Heavy 7/16" rope wicking and insulating cement are used to seal the front plate after it is bolted to the boiler.

OBSERVATION DOORS AND FRAMES

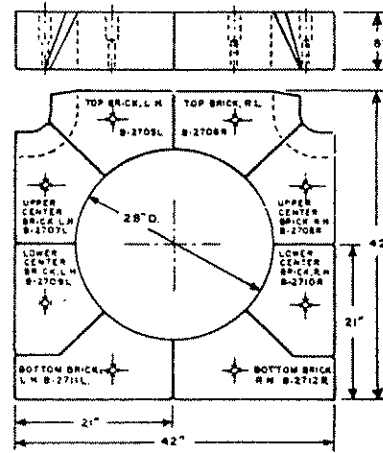
1. After the front plate is in position, take one observation cover frame and install it over the opening. See figure No. 11. Note that the L.H. side is assembled with 5/16 - 18 x 3/4 hex bolt and latch to allow the observation cover to swing toward the center of the boiler. Assemble cover to swing open on the 7/16 O.D. brass bushing with 5/16 - 18 x 3/4 hex bolt assembly to the front plate.

FIGURE 11
OBSERVATION COVER & FRAME ASSEMBLY - L.H. SHOWN R.H. IS OPPOSITE



25" OPENING ALL PREFERRED AND I/C D-105 & D-145 BURNERS

FIGURE 13

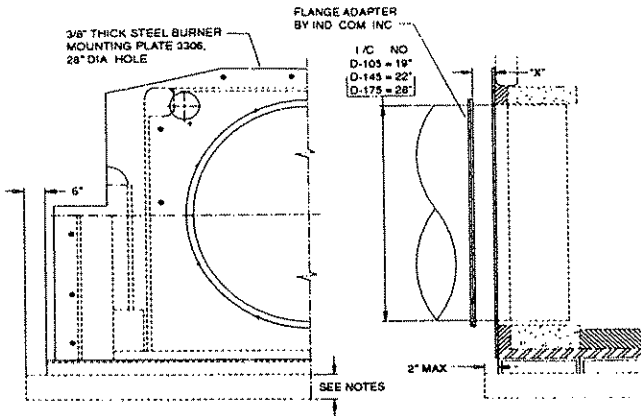


28" OPENING 22 - 25 SECT. I/C D-175 BURNER ONLY

FIGURE 14

SERIES 650 COMBUSTION CHAMBER ASSEMBLY INSTRUCTIONS

FIGURE 15



- NOTES:
- 6" HIGH CONCRETE PAD REQUIRED FOR D-145 AND D-175.
 - FOR LOW NO_x BURNERS USE:
10" PAD ON 23 & 24 SECTION
12" PAD ON 25 SECTION.

FRONT BRICK AND INSULATION

- Place the two lower front insulation boards against the back of front plate. Place L.H. bottom brick, B-2221L/B-2711L against insulation board. Line up bolt holes in front plate, insulation board and brick. Then assemble, 1/2" - 13 x 6" bolt, washer, and nut. Assemble R.H. bottom brick and hardware.
- Place L.H. lower center brick and R.H. lower center brick in position on top of bottom brick, assemble hardware and tighten.
- Place the two upper front insulation boards against the back of front plate. Place L.H. upper center brick in position, assemble hardware and tighten.
- Place L.H. top brick and R.H. top brick on top of upper center bricks, assemble hardware and tighten.
- Place the filler bricks, B-2227, in position, one on each side between the front and side bricks as shown in figure 6.
- When 28" opening is used, cut insulation board with a knife to proper size. This completes combustion chamber assembly.

COMBUSTION CHAMBER SCHEDULE

ITEM	NUMBER OF SECTIONS											
	15	16	17	18	19	20	21	22	23	24	25	
2 x 12 x 18 (Side Horizontal)	8						8					
					4	4					4	
		8						8				
			8		8				8		8	
		12	12	12	12	12	12	12	12	12	12	
		16	16	16	24	16	24	24	24	24	32	24
FILL BRICK	5-1/2 x 5-1/2 x 14-1/2 (B-2227)	2	2	2	2	2	2	2	2	2	2	
FOOT BRICK	6 x 6 x 4 (B-1823A)	4	2	4	2	4	2	4	2	4	2	4
	12 x 6 x 4 (B-1829A)	17	19	19	21	21	23	23	25	25	27	27
BACK BRICK	#3359A (Lintel)	1	1	1	1	1	1	1	1	1	1	1
	#3360A (Back Support)	2	2	2	2	2	2	2	2	2	2	2
	#3261A (L.H. Center Back)	1	1	1	1	1	1	1	1	1	1	1
	#3362A (R.H. Center Back)	1	1	1	1	1	1	1	1	1	1	1
	#3363A (Back Corner)	2	2	2	2	2	2	2	2	2	2	2
SIDE BRICK	12" Front (B-1818)	4		6	2	8	4		6	2	8	4
	15" Front (B-2247)	6	10	6	10	6	10	14	10	14	10	14
	15" Back (B-2249)	2	2	2	2	2	2	2	2	2	2	2
FRONT BRICK	R.H. Bottom (B-2222R)	1	1	1	1	1	1	1	1	1	1	1
	L.H. Bottom (B-2221L)	1	1	1	1	1	1	1	1	1	1	1
	R.H. Lower Center (B-2220R)	1	1	1	1	1	1	1	1	1	1	1
	L.H. Lower Center (B-2219L)	1	1	1	1	1	1	1	1	1	1	1
	R.H. Upper Center (B-2218R)	1	1	1	1	1	1	1	1	1	1	1
	L.H. Upper Center (B-2217L)	1	1	1	1	1	1	1	1	1	1	1
	R.H. Top (B-2216R)	1	1	1	1	1	1	1	1	1	1	1
	L.H. Top (B-2215L)	1	1	1	1	1	1	1	1	1	1	1
FRONT INSUL	Upper Front (B-2224)	2	2	2	2	2	2	2	2	2	2	2
	Lower Front (B-2225)	2	2	2	2	2	2	2	2	2	2	2
FIRE BRICK	9 x 4-1/2 x 3	9	9	9	9	9	9	9	9	9	9	9
	9 x 3-1/2 x 3	3	3	3	3	3	3	3	3	3	3	3
	9 x 4-1/2 x 2-1/2	103	115	117	127	139	141	151	163	165	175	187
	9 x 3-1/2 x 2-1/2	15	16	18	19	20	22	23	24	26	27	28
	6 x 4-1/2 x 2-1/2	4	2	12	4	2	12	4	2	12	4	2
	3 x 4-1/2 x 2-1/2	10	2		10	2		10	2		10	2
	9 x 4-1/2 x 2-1/2	70	80	90	90	100	110	110	120	130	130	140
9 x 3 x 2-1/2	14	16	18	18	20	22	22	24	26	26	28	
6 x 4-1/2 x 2-1/2	10			10			10			10		
6 x 3 x 2-1/2	2			2			2			2		
3 x 4-1/2 x 2-1/2		10			10			10			10	
3 x 3 x 2-1/2		2			2			2			2	

WARNING

Any appliance that burns natural gas, propane gas, fuel oil, wood or coal is capable of producing carbon monoxide (CO).

Carbon Monoxide (CO) is a gas which is odorless, colorless and tasteless but is very toxic.

If your Smith boiler is not working properly, or is not vented properly, dangerous levels of CO may accumulate. CO is lighter than air and thus may travel throughout the building. **BRIEF EXPOSURE TO HIGH CONCENTRATIONS OF CO, OR PROLONGED EXPOSURE TO LESSER AMOUNTS OF CO MAY RESULT IN CARBON MONOXIDE POISONING.**

EXPOSURE CAN BE FATAL AND EXPOSURE TO HIGH CONCENTRATIONS MAY RESULT IN THE SUDDEN ONSET OF SYMPTOMS INCLUDING UNCONSCIOUSNESS.

Symptoms of CO poisoning include the following:

- | | | |
|-----------|------------------------|---------------------|
| dizziness | vision problems | shortness of breath |
| headaches | loss of muscle control | unclear thinking |
| nausea | weakness | unconsciousness |

The symptoms of CO poisoning are often confused with those of influenza, and the highest incidence of poisoning occurs at the onset of cold weather or during flu season. A victim may not experience any symptoms, only one symptom, or a few symptoms. Suspect the presence of carbon monoxide if symptoms tend to disappear when you leave your home.

The following signs may indicate the presence of carbon monoxide:

- Hot gases from appliance, venting system, pipes or chimney, escaping into the living space.
- Flames coming out around the appliance.
- Yellow colored flames in the appliance.
- Stale or smelly air.
- The presence of soot or carbon in or around the appliance.
- Very high unexplained humidity inside the building.

If any of the symptoms of CO poisoning occur, or if any of the signs of carbon monoxide are present, **VACATE THE PREMISES IMMEDIATELY AND CONTACT A QUALIFIED HEATING SERVICE COMPANY OR THE GAS COMPANY OR THE FIRE DEPARTMENT.**

To reduce the risk of CO poisoning, have your heating system "tuned up" by a licensed heating contractor or the gas company -- preferably before each heating season. Also have the service company check your chimney or vent pipes for blockage.

Your home should also be adequately ventilated, particularly if you have insulated your home.

ONLY QUALIFIED, LICENSED SERVICE CONTRACTORS SHOULD PERFORM WORK ON YOUR SMITH BOILER.

WARNING

Install, operate and maintain unit in accordance with manufacturer's instructions to avoid exposure to fuel substances or substances from incomplete combustion which can cause death or serious illness. The State of California has determined that these substances may cause cancer, birth defects, or other reproductive harm. Also, install and service this product to avoid exposure to airborne particles of glasswool fibers and/or ceramic fibers known to the State of California to cause cancer through inhalation.



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