IBC
Gas-Fired Boilers

IBC Technologies Inc.

1445 Charles Street
Vancouver, B.C. V5L 2S7
Canada
Tel (604) 877-0277
Fax (604) 877-0295

Memorandum 2006-03

Troubleshooting the "Insufficient Airflow" Error Condition

Please follow this routine, expanded from that shown in the certified Installation and Operating Instructions manual:-

1. **Check fan operating status** – cycle power to boiler, and confirm fan runs through an operating cycle during the initialization phase. If not, remove the metal corner cover at the right side of the controller and look into the wiring box for the DC power supply located at the lower left. Note a LED lamp – confirm light is steady green and NOT flashing. If flashing, this reflects a short circuit on the fan circuit board. Requires fan replacement. Inspect fan circuit board for signs of acidic moisture (e.g. discoloured copper components), water or solder damage, call IBC and upon request return fan for factory inspection.
2. If fan runs properly, **check the clear vinyl air reference lines** below the Fan / gas valve assembly for signs of trapped moisture. Repeated interruptions of the boiler's post-firing moisture management routine (e.g. by recurring / abrupt removal of power in new construction situations) can permit combustion moisture to backflow across the burner and into the gas train. Remove tubing at each end from boiler and blow clear. Do not create excessive pressure on the black disk-shaped air pressure sensor – this has a maximum rating of ⅓ psi / 10"w.c. (easily generated by blowing into the 5/16" tubing if connected to the sensor).
3. **Confirm any moisture per step 2 did not enter the black air pressure sensor**; using the boiler's control keypad, go to *Advanced Diagnostics* and move the cursor down to line 8 – *Fan Pressure*. This and the 3 preceding lines (*Fan Speed (RPM*), *Fan Duty Cycle* and *Required Pressure*) display fan operating data. With the fan off (*Fan Duty Cycle* = 0), the *Fan Pressure* should read 102 +/- 5. Next check with the fan in operation, and look for an increased *Fan Pressure* value. If non-spec values or no movement with fan operation, replace sensor.
4. If tests 1 -3 are clear, **use the Advanced Diagnostics screen** as described in 3 above **to evaluate achieved fan power**. In normal operation, *Fan Pressure* should move toward to the *Required Pressure* value. At full power (Fan RPM approx. 6,400; Fan Duty Cycle at 4,096), the *Fan Pressure* should read 309 or near. Marginally excessive length and wet venting might read 260 to 280. Serious blockages will take the reading well below this; 2 recent cases indicated 120 -150 vs. the 309 target – and the procedure used to locate the blockages was as follows:
5. **Drain and refill condensate trap**. If signs of anything beyond discoloured water, remove burner and flush water down through heat exchanger until free flow is re-established at the trap. Ensure trap refilled prior to next step.

6. **Disconnect intake air piping to isolate this potential blockage**. Loosen the 3 gear clamps and pull intake down / away from the fan intake housing. Note:- IBC supplied ABS intake piping is not factory glued, so can be opening without undue force. Retry ignition. In one of the recent cases, good operation was restored after the following corrective action :(1) intake piping blown clear and (2) filtration screen added at the intake terminal.
7. If still unsolved, **remove burner and examine** for internal fouling. Vacuum or blow clear. Blockage must be well over 50% of the surface area to cause an "Insufficient Airflow" system shutdown. Ensure burner is re-installed with the seam placed away (e.g. rotated 180°) from the ignitor. Turn off gas and open the viewport to confirm appropriate spark gap after burner movement; gap should be 1.25 to 1.5 times the diameter of the spark rod, using the rod tip as your gauge.
8. If only minor debris is noted within the burner, proceed to **open the fan / gas valve assembly**. Locate and remove 3 screws on the underside of the gas valve (see #13 on explosion drawing – Manual page 52). One is at the front, immediately to the right of the connection point of the vinyl air reference hose. The second is at the left – closest point to the heat exchanger (the gear clamp at the top of the 2"ABS pipe will have been removed at step 6 so will not impair access to the 2nd screw. The one at the back is more difficult to reach. It is helpful to remove the black air pressure sensor to increase workspace (place screwdriver tip on the metal surface behind and below the sensor and lever upward to release the disk from its mounting posts. These M4 x 30mm Phillips head screws can be removed completely – keep turning. Once the fan has been removed, the black plastic Intake Air Housing must be separated into its 2 parts; place a screwdriver in an upward direction in the molded plastic inlet of the Intake Housing (where the 2" ABS pipe connects). Give a modest upward jolt to the screwdriver handle to break the silicon seal. Take a moment to register or mark the assembly orientation of the "swirlplate" blade before its removal.

   In the second of the 2 recent blockage events, several ¾" wood chips along with a cubic inch of pine needles were found within the Intake Air Housing. This site – with the air intake located directly under deep forest cover - indicated a need for custom filtration at the intake terminal (a screen basket was fashioned using a 3" x 2" reducing coupler).
9. Reassemble & restart: (1) ensure Intake Housing parts are placed in correct alignment for the air reference port – it must line up with the hole near the 2nd screw position, (2) it is not necessary to re-silicon the 2-part air Intake Housing, and in fact we prefer that untrained service people not attempt this for the risk of fouling its airflow dynamics, (3) tighten the 3 screws on the fan / gas valve assembly evenly and do not over-stress – these are tapped into aluminum. Note the Intake Air Housing area is a negative pressure zone, so slightly increased noise (not gas leaks) is the only penalty for not resealing the housing or under-tightening the screws.
10. Ensure any needed revisions at the intake air terminal (e.g. screen or filter) are done.

April 5, 2012