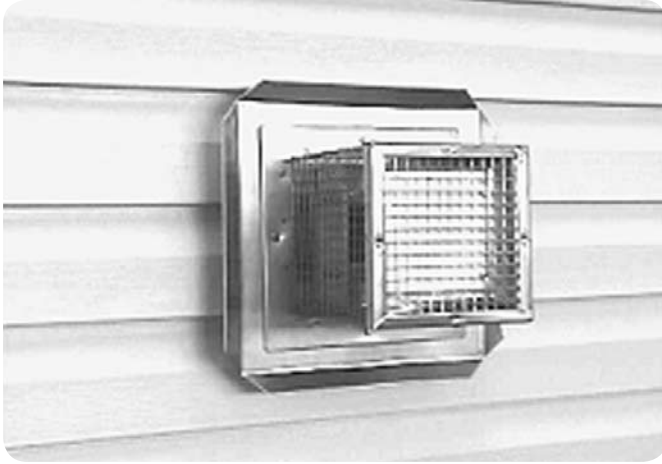


DIRECT VENT

INSTRUCTIONS FOR HIGH EFFICIENCY OIL-FIRED HOT WATER BOILER



NOTICE

Information contained in this manual pertains to direct vent boilers equipped with a manufacturer installed blocked vent safety control system (pressure switch).

⚠ CAUTION

Be sure to keep the area around the vent terminal free of snow, ice, and debris.

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DIRECT VENTING OF OIL FIRED BOILERS

Installation shall be done by a “Qualified “Installer. “Qualified Installer” shall mean an individual who has been properly trained or is a licensed installer.

The term Direct Vent refers to a sealed combustion system.

The Direct Vent series is ideal for applications where a conventional chimney is unavailable, nor easily installed; an electrically heated home being retrofitted for oil forced air heating for example.

Direct vented appliances require some foresight and planning, since the range of flue lengths is restricted, clearances are critical, and national and local codes are quite strict with respect to safety. Be sure that the Boiler can be installed within the physical limitations of the home, and accordance with local codes and regulations.

Physical limitations include practical issues such as sufficient clearance to grade. Avoid vent termination locations subject to frequent strong wind gusts. (See **Table 1** for approved venting.)

Oil Burners:

The Beckett NX and Riello’s 40BF series Oil burners, are certified for venting through the wall using ducted outdoor air for combustion.

The standard Beckett AFG Series is not certified for use, or recommended for direct vent applications.

The oil burner contains a probe to measure the overfire pressure and a pressure switch which will not permit the burner to operate if the intake or exhaust becomes blocked.

Figure 1 - Standard Vent Terminal Assembly



VENT TERMINAL LOCATION

Installation in Canada

The through the wall termination shall be installed in accordance with the latest editions of CAN/CSA B-139 (Canada), NFPA-31 (United States), and / or any applicable local codes and these instructions.

Please refer to **Figure 2**. In **Canada**, the vent terminal shall not terminate:

- A. Directly above a paved sidewalk or a paved driveway that is located between two buildings, and that serves both of them.
- B. Less than 7 feet (2.13 m) above any paved sidewalk or a paved driveway.
- C. Within 6 feet (1.80m) of a window, door, or mechanical air supply inlet to any building, including soffit openings.
- D. Above a gas / regulator assembly within 3 feet (1 m) horizontally of the centerline of the regulator.
- E. Within 6 feet (1.80 m) of any gas service regulator vent outlet or within 3 feet (1 m) of any oil tank vent or any oil tank fill inlet.
- F. Less than 1 foot (0.3 m) above grade level within 6 feet (1.80 m) of any combustion air inlet, unless the appliance is otherwise certified.
- G. Within 6 feet (1.80 m) of the property line.
- H. Underneath a veranda, porch, or deck.
- I. So that the flue gases are directed at combustible material or at any openings of surrounding buildings that are within 6 feet (1.80 m).
- J. Less than 3 feet (1 m) from an inside corner of an L-shaped structure.
- K. So that the bottom of the vent termination opening is less than 1 foot (0.3 m) above any surface that may support snow, ice, or debris.
- L. So that the flue gases are directed towards bricks, siding, or other construction, in such a manner that may cause damage from heat or condensate from the flue gas.
- M. Within 4 feet (1.2 m) of a power venter.

Figure 2 - Vent Terminal Locations (Canada)

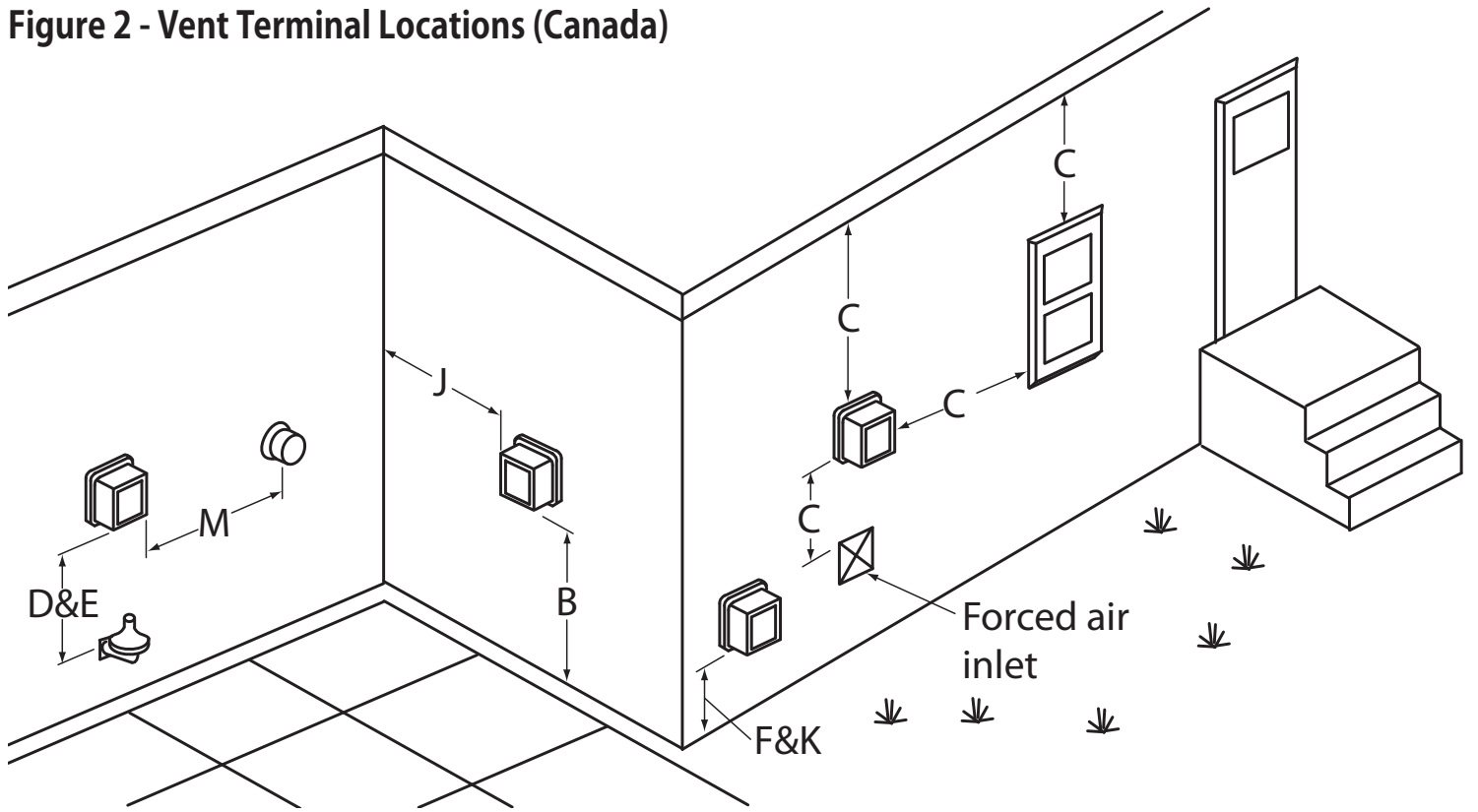
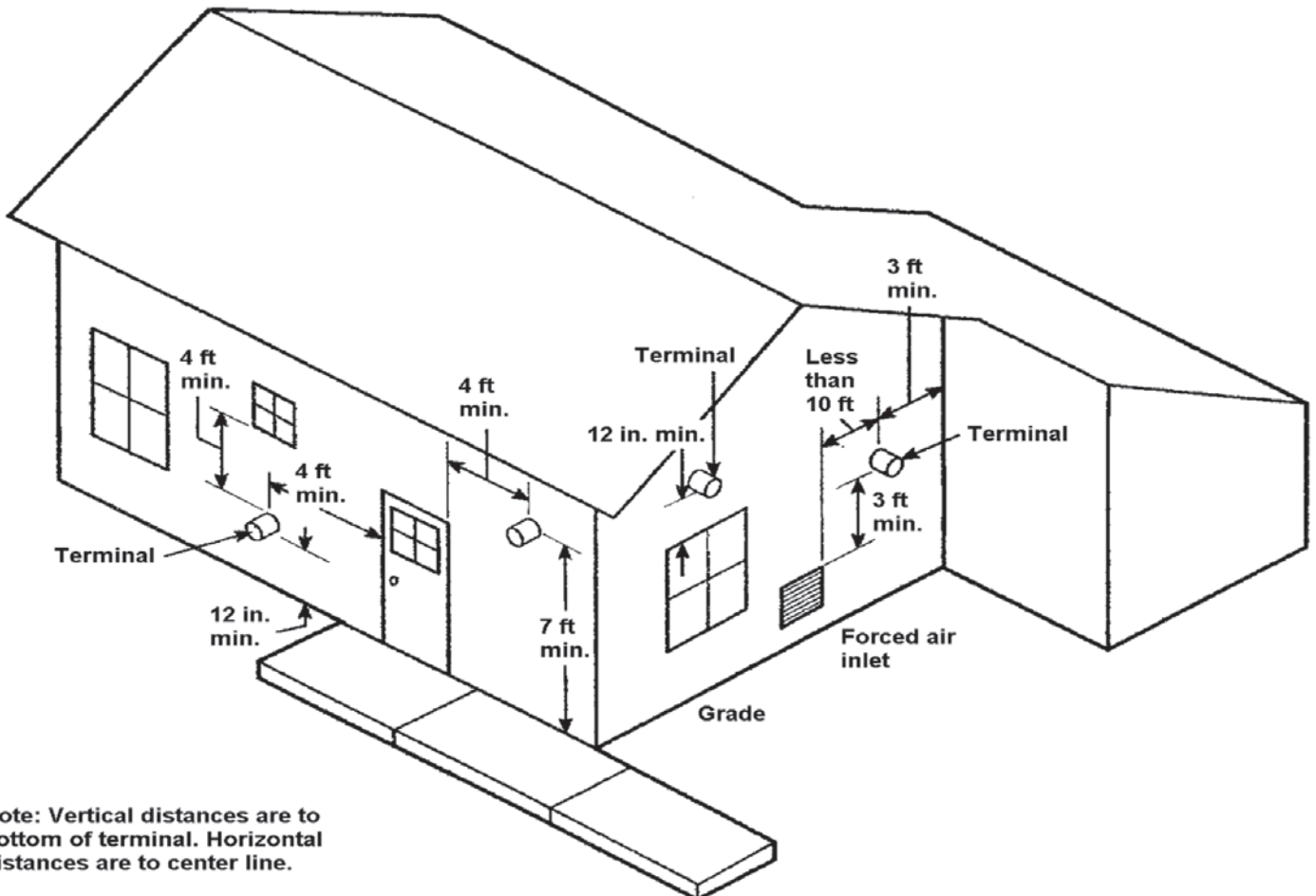


Figure 3 - Vent Terminal Location (USA)



Note: Vertical distances are to bottom of terminal. Horizontal distances are to center line.

Installation in USA

Please refer to **Figure 3**. In the **United States**, a vent terminal shall not terminate:

- Less than 7 feet (2.13 m) above any adjacent public walkway.
- Less than 4 feet (1.22m) below, 4 feet horizontally, or 1 foot (0.3m) above a door, window, or gravity air inlet of the structure.
- Less than 1 foot (0.3m) above grade.
- Less than 1 foot (0.3m) from the soffit of the roof of the structure.
- Less than 3 feet (0.9m) from the inside corner of an L shaped structure.
- Less than 5 feet (1.6m) of a gas regulator vent outlet, or oil tank vent outlet.
- Underneath a veranda, porch or deck.

VENT TERMINAL INSTALLATION

This appliance is certified with only the equipment specified in **Table 1**. Select the location of wall penetration that conforms to the code for exterior location, as close to the appliance as possible, maintains clearance to combustibles and where the minimum 1/4 inch per foot slope back to the appliance can be maintained. The vent terminal can be installed in any wall having a minimum thickness of 5", and a maximum thickness of 10".

Figure 4 - Inside View of Vent Terminal



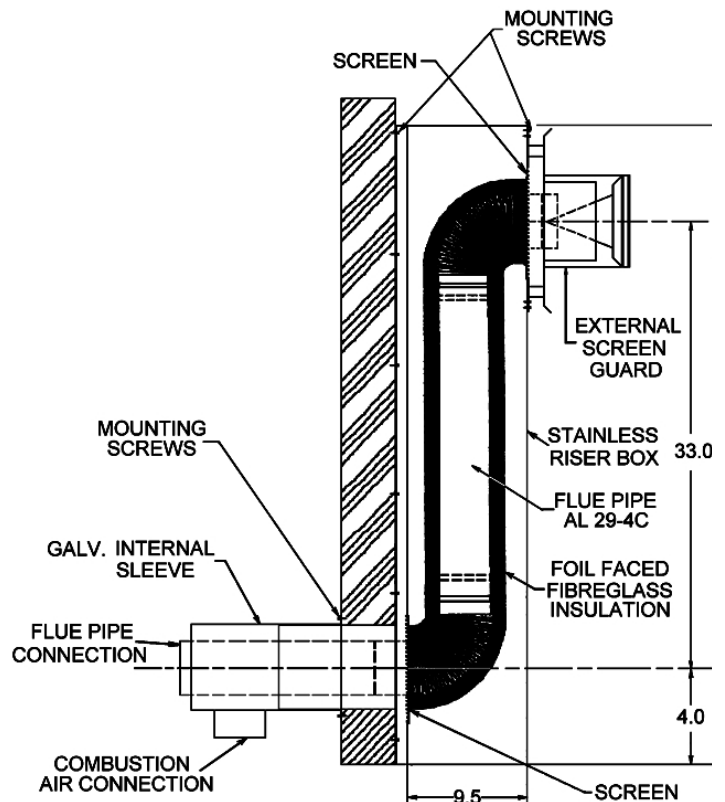
- Cut a 6-1/2" diameter hole through the wall.
- Remove the Intake Air Sleeve from the Terminal.
- Insert the Terminal through the wall from outside, secure with 4 screws to the wall, and seal to wall with a weather-proof sealant.

From inside the building, re-attach the Intake Air Sleeve and secure the inner sleeve to the outer sleeve with 2 screws. Use 4 screws to secure Sleeve to the wall. See **Figure 4**. Ensure that the Intake Air Connector is located for ease of attachment and complies with code.

VENT TERMINAL RISER KIT

This kit has been designed to increase the height of the vent terminal by approximately 3 feet, (see **Figure 5**) This is ideal where excessive snow build up could occur or where more flexibility is required to maintain minimum clearances at grade.

Figure 5 - Vent Terminal Riser



DIRECT VENT INTAKE AIR PIPE INSTALLATION

⚠ WARNING

Flexible duct for combustion air use is not permitted.

Important: outdoor air for combustion must be used.

The oil burners approved for use with outdoor air for combustion are the Beckett NX and the Riello 40BF. All units obtain outdoor air by the following means:

Acceptable combustion air intake materials:

Beckett NX Burner -

- 4 inch "C" Vent (single wall galvanized).
- 4 inch Rigid Aluminum pipe (0.030" wall thickness).

Riello 40BF Burner -

- 4 inch "C" Vent (single wall galvanized).
- 4 inch Rigid Aluminum pipe (0.030" wall thickness). 4-inch pipe should be used from the terminal to the appliance where it will be reduced to 3 inch pipe to attach to the burner inlet collar.

Intake pipe and fittings should be sealed with foil tape, duct tape, or silicone caulking and attached mechanically with screws.

Maximum combustion air intake length is 25 feet using eight 90° elbows. Combustion air intake does not have a minimum length.

Condensation may become a problem during some climatic conditions. It may be necessary to wrap a portion, or the entire intake piping (particularly metal intake piping) with a water-proof insulation material.

VENTING INSTALLATION - DIRECT VENT

⚠ WARNING

Do not enclose vent.

Do not route vent through walls, floors or ceilings.

The venting and vent terminal are dedicated to the Boiler only; do not attempt to vent any other appliance through it.

Installation Of Flexible Vent.

The flexible exhaust duct supplied is a double wall, one (1) inch clearance to combustibles flexible venting material. The inner pipe is constructed of 4 inch inside diameter 316 stainless steel, with a two-ply aluminum outer pipe. High temperature insulation separates the inner and outer flex pipes.

Figure 6 - Appliance Connector w/ Test Port

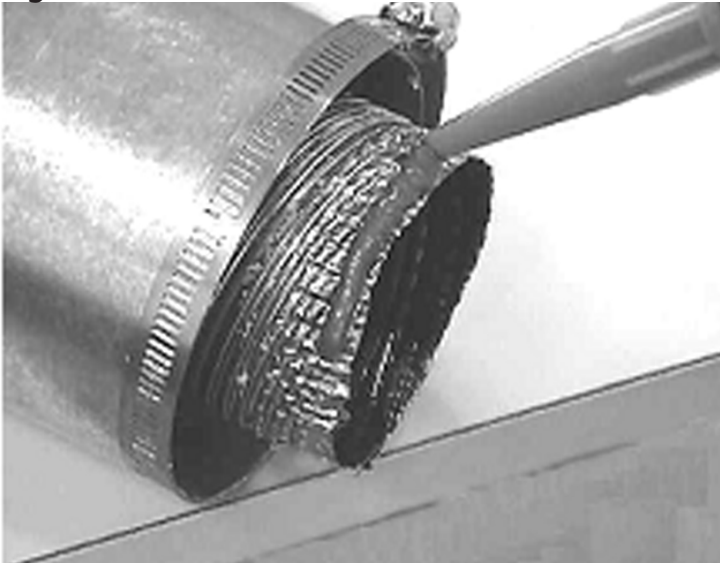


The venting installation must comply with CAN/CSA B139 Installation Code for Oil Burning Equipment (Canada) or NFPA 31 Standard for the Installation of Oil Burning Equipment (United States), and / or with local codes and regulations, and with these instructions.

1. In as short and straight a run as possible without any unnecessary bends.
2. There should not be any dips or sags throughout the full length of vent.
3. The connector or vent should be sloped upwards from the appliance at least 1/4" per foot.
4. Do not bend the connector or vent more than 90 degrees.
5. The vent may be cut to a minimum of 5 feet in length using a fine tooth (24 teeth per inch) hacksaw blade.

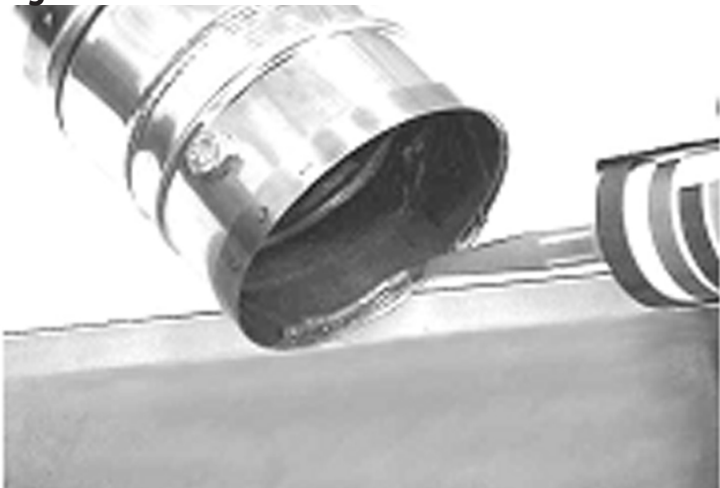
6. The male and female ends of the appliance adapters and connectors must be cleaned with residue free brake cleaner solvent.
7. Apply a minimum 1/4" bead of Si-Ultra Copper Sealant provided, onto the outside of the male end of the vent to appliance connector. Fit the connector to the vent by threading it counter-clockwise until it stops. Ensure the joint is not cross-threaded. Tighten the gear clamp on the outer cover. See **Figure 7, 8 & 9.**

Figure 7 - Male End



8. Apply a minimum 1/4" bead of the same sealant as mentioned above onto the female end inside of the connector. Slip connector over the end of the appliance collar until it stops. Tighten the attached gear clamp. See **Figure 8.**

Figure 8 - Female End



9. Support the Vent every 36" to prevent sagging.
10. Attach the Terminal Connector as described in the two steps listed above.

11. The maximum vent length is 20 feet (using a 20 foot vent kit). Piecing vent kits together (i.e. using 2 ten foot kits) is strictly prohibited.

⚠ CAUTION

Use appropriate safety precautions! All thin metal edges are extremely sharp.

BLOCKED VENT SAFETY SWITCH PRESSURE TUBING CONNECTIONS

The tubing connections should be checked on all Boilers prior to firing the unit. The Beckett NX has a low and high side tube, the vacuum side goes to the air intake box and the pressure side goes to the overfire pressure probe. See **Figure 11.**

The Riello BF low pressure side is open inside the air tight burner cover and high pressure side goes to the overfire pressure probe. Ensure that the burner cover is air tight and that all the hole plugs are in place.

OPERATION OF OIL BURNERS

Once the Boiler flue pipe and intake pipe are completely installed. In the absence of the burner manufacturer's instructions, use the following instructions to set the burner:

- Shut off the electrical power to the Boiler.
- Install an oil pressure gauge to the pressure port on the oil pump. (Riello requires a special adapter)
- Check air settings for initial firing in **Table 2 or Table 3.**
- Restore electrical power to the Boiler.
- Start the Boiler and bleed all air from the fuel oil lines.
- Close the purge valve and fire the unit.

When the Boiler has reached "steady state" (after approximately 5 minutes), remove the bolt (test port) from the center of the Appliance Adapter to the Boiler. Set the combustion air control to get a TRACE to ZERO smoke.

Beckett NX Burner:

Using **Table 2**, select head setting according to the required firing rate. Final adjustments will be required once the burner has been started.

Final Adjustments

- Always tighten lock nuts and screws before making measurements.
- Using suitable testing instruments for CO₂ (or O₂), measure the combustion products. The CO₂ in the stack

should be a minimum of 12% CO₂ at a trace of smoke. For clean operation of the burner, open the air control to introduce enough excess air into the system to reduce the CO₂ by 10% of the original trace point.

EXAMPLE: 12% CO₂ minus 1.2 (which is 10% of 12) equals 10.8% CO₂).

Riello 40BF Burner:

Refer to **Figure 10**. Check the initial air shutter and head settings. Remove the burner cover and turn the air shutter adjustment screw (2) until the top edge of the air shutter (3) is in alignment with the corresponding number in **Table 3**.

CAUTION

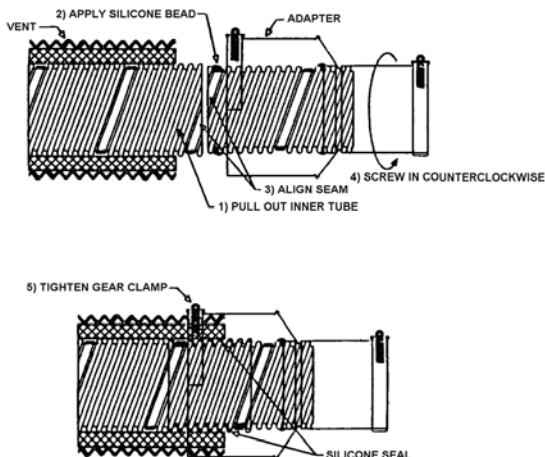
Riello burner pressure gauge threads are British Parallel Thread design. A test gauge with an NPT fitting will ruin the pump body. Use a Riello pressure gauge or an adapter.

Further adjustments must be made with the burner cover in place by unscrewing the plug on the cover. Turn the screw clockwise to increase combustion air or counter clockwise to decrease combustion air.

- The final position of the shutter will vary on each installation. Use instruments to establish the proper settings for maximum CO₂ and a smoke spot reading of zero. Re-insert the plastic cap over the air adjustment hole before any measurements.

Variations in flue gas, smoke, CO₂ and temperature readings may be experienced when the burner cover is put in place. Therefore, the burner cover must be in place when making the final adjustments to ensure proper test results.

Figure 9 - Flex Vent Assembly Detail



BLOCKED VENT SAFETY SHUT OFF SYSTEM (BVS)

Each direct vent Boiler is equipped with a Blocked Vent Safety shut off system (BVS). This safety circuit will shut the burner off in the event of a combustion air blockage or venting blockage. It is best to have the burner shutter and or head settings close to Table 2 or Table 3.

Beckett NX

The BVS pressure switch is wired in series with the CAD cell. See Wiring Diagram, **Figure 12**.

Riello 40BF

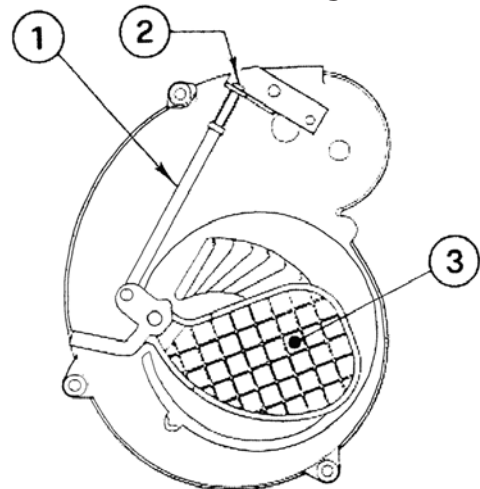
The BVS pressure switch is wired in series with terminals 10 and 11 on the 530SE control. See Wiring Diagram, **Figure 13**.

SEQUENCE OF OPERATION

Beckett NX

1. Room temperature drops, thermostat calls for heat.
2. Pre-purge begins, lasting 5 to 15 seconds.
3. The oil solenoid and BVS are energized
4. Oil Solenoid opens allowing oil to reach the Burner Electrodes. Burner ignition begins.
5. If the vent is clear and the pressures switch is closed and the Cad cell detects light from combustion, this disconnects the primary control safety circuit, allowing combustion to continue. The BVS is energized.
6. After 15 to 45 seconds (depending on primary control characteristics), the electric spark across the electrode tips stops, combustion continues.

Figure 10 - Air Shutter Setting



7. Boiler continues to operate and will eventually reach “steady state”, the point at which the system temperature stabilizes.
8. Room temperature rises, thermostat is satisfied, heating contacts open.
9. Oil Solenoid Valve closes, combustion stops, Burner Motor remains on to complete the Post Purge Cycle. Post Purge time can be 0 to 8 minutes depending on the settings. The factory default is 2 minutes. Timing can be changed using a Beckett 5206 Genisys display.
10. Boiler remains idle until the next call for heat.

Riello 40BF

1. Room temperature drops, thermostat calls for heat.
2. Pre-purge begins, lasting 5 to 15 seconds. The BVS is energized.
3. If the flue is clear, the pressure switch will allow the ignition sequence to continue.
4. Oil Solenoid opens allowing oil to reach the Burner Electrodes. Burner ignition begins.
5. Cad cell detects light from combustion, disconnects the primary control safety circuit, allowing combustion to continue.
6. After 15 to 45 seconds (depending on primary control characteristics), the electric spark across the electrode tips stops, combustion continues.
7. Boiler continues to operate and will eventually reach “steady state”, the point at which the system temperature stabilizes.
8. Boiler remains idle until the next call for heat.

FINAL CHECK OUT

Carefully examine the complete vent system for leaks. This may be done by spraying a soapy solution on all joints and watching for bubbles during the pre-purge. The hot vent can be checked with a lit taper for signs of air movement around joints or seams.

Ensure that all safety devices and electrical components have been set for normal operation. Ensure that all electrical connections are tight and that the wiring is secure.

IMPORTANT: Please ensure that the homeowner is informed and understands:

1. Where the circuit breaker or fuse is located in the main electrical panel.
2. Where the Boiler switch is located, and the switch “on” and “off” positions if not obvious.
3. Where the oil shut-off valve from the oil storage tank is located.
4. To keep the area around the vent terminal free of snow, ice, and debris.
5. How to operate the thermostat, and other related accessories.
6. How to operate the manual reset button on the primary control, and especially when not to push the reset button.
7. How and where to visually inspect the venting system for leaks or other problems.
8. How to inspect, clean and replace the air filter, and other homeowner maintenance procedures.
9. Who to call for emergency service and routine annual service.
10. The terms and conditions of the manufacturer’s warranty and the contractor’s warranty.

BURNER SETTINGS TABLES

TABLE 1: THE HIGH EFFICIENCY OIL BOILER IS CERTIFIED FOR USE ONLY WITH THE FOLLOWING PART NUMBERS

Burner Options	Items with Boiler		Termination Options	Part Number	Vent Length Options	Part number	Field Supplied Items
	Item	Part Number					
Riello 40BF	4-7/8" to 4" Appliance Adapter	240007535	STD Terminal	28972	4" ID x 10 FT	240006909*	4x3" Single wall Reducer for Riello
Beckett NX			36" Riser	29231	4" ID x 15 FT	240006910*	Single Wall Vent 25 FT Max With Up To (8) 90 Deg. Elbows
					4" ID x 20 FT	240006911*	

*Includes Terminal Adapter and Caulking p/n 240006914

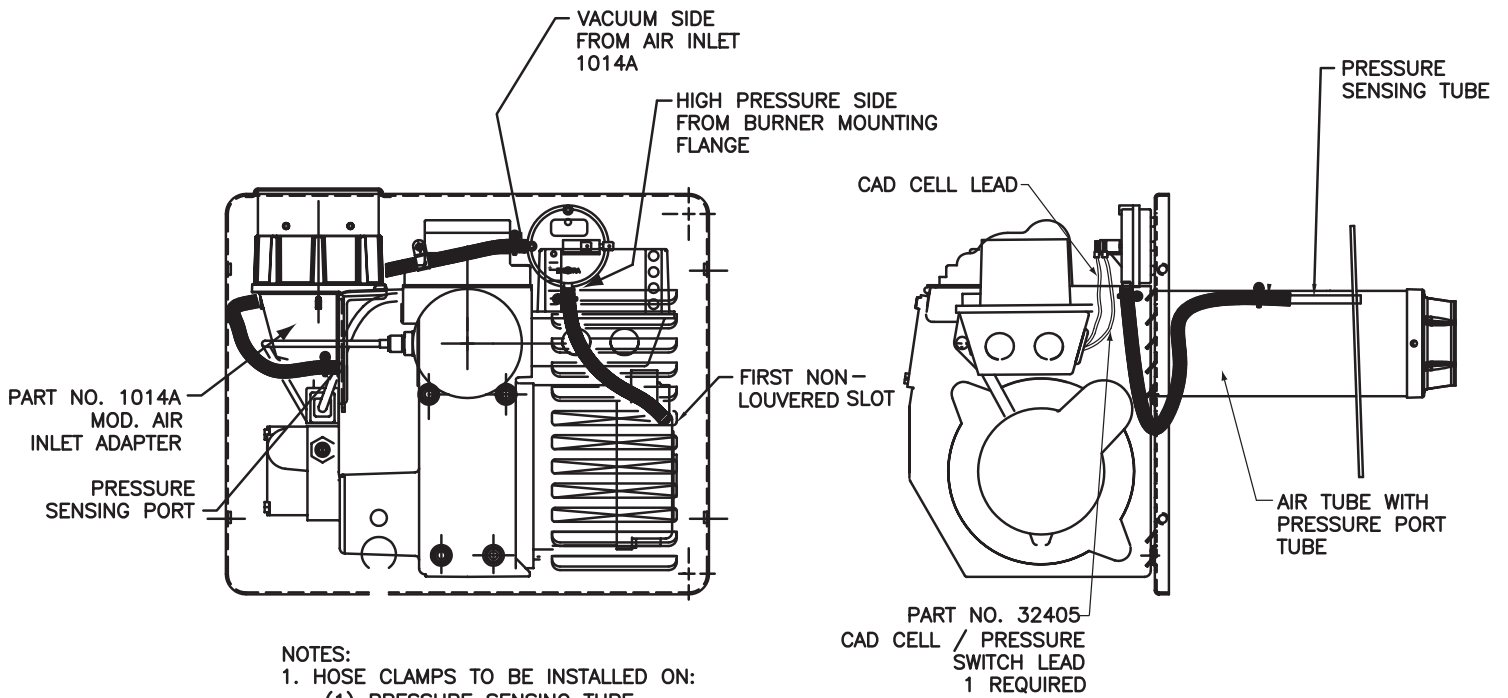
TABLE 2: BECKETT NX (DIRECT VENT) BURNER SETTINGS

BOILER SIZE	MODEL	HEAD	AIR TUBE	INSERT DEPTH	FIRING RATE (GPH)	PUMP PRESSURE (PSIG)	NOZZLE MFR	NOZZLE	NOZZLE MFR	ALT. NOZZLE	PRES SWITCH (INWC)	AIR HEAD SETTING
4	NX	NX1	NX70LC	2.675	0.75	170	D	0.60 X 60B	D	0.60 X 60W	0.65	2.25
5	NX	NX1	NX70LC	2.675	1	175	D	0.75 X 45B	F	0.75 X 45AS	0.85	4
6	NX	NX2	NX70LD	2.675	1.30	175	D	1.0 X 45B	H	1.0 X 60B	0.65	2
Timings				Nozzle MFR: D = DELAVAN H = HAGO F = DANFOSS								
Pre-purge		15 seconds										
Post-Purge		Adjustable										

TABLE 3: RIELLO 40BF (DIRECT VENT) BURNER SETTINGS

BOILER SIZE	MODEL NO.	HEAD TYPE	INSERT DEPTH	FIRING RATE (GPH)	PUMP PRESSURE (PSIG)	NOZZLE MFR	NOZZLE	NOZZLE MFR	ALT. NOZZLE	AIR HEAD SETTING	AIR SHUT SETTING	PRES SWITCH (INWC)
4	40BF3	REVERSE	2.75	0.75	150	D	0.65 X 60B	D	0.60 X 60B	3	5	0.25
5	40BF5	STD	2.75	1	175	D	0.75 X 60B	H	0.75 X 60B	1	5	0.8
6	40BF5	STD	2.75	1.30	175	D	1.0 X 45B	H	1.0 X 45W	2	8	0.9
Timings				Nozzle MFR: D = DELAVAN H = HAGO F = DANFOSS								
Pre-purge		12 seconds										
Post-Purge		Adjustable										

Figure 11 - Beckett NX With Blocked Flue Pressure Switch Safety



- NOTES:
- HOSE CLAMPS TO BE INSTALLED ON:
 - PRESSURE SENSING TUBE
 - PRESSURE SWITCH, BOTH PORTS
 - 1014A PRESSURE SENSING PORT
- POSITION CLAMP WHERE TUBE IS OVER PORT. LIGHTLY TUG TO CONFIRM THAT ITS SECURE.

Figure 12 - Wiring Diagram: Beckett NX With Genisys™ 7505 (15 Seconds pre purge, 2 minutes post purge)

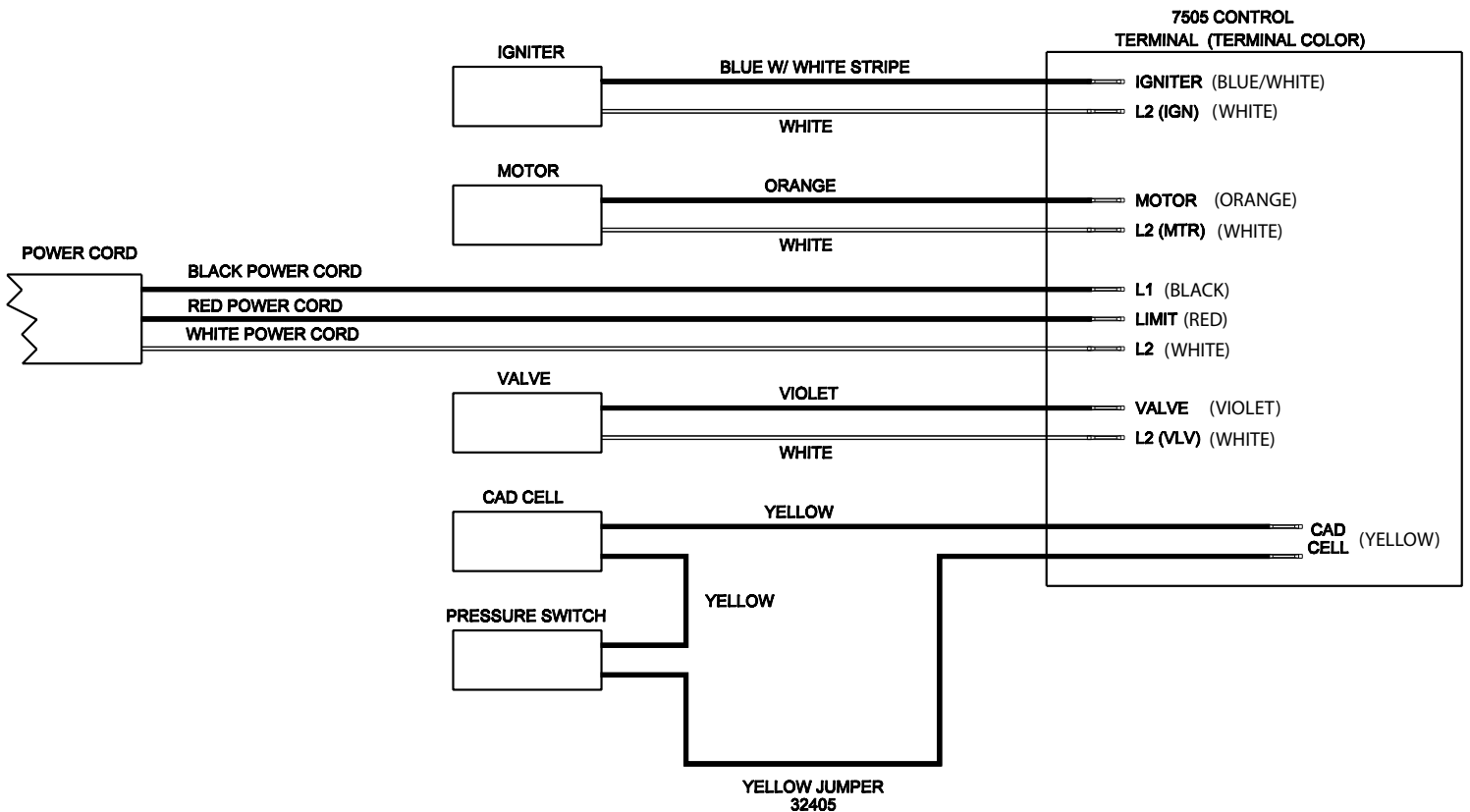
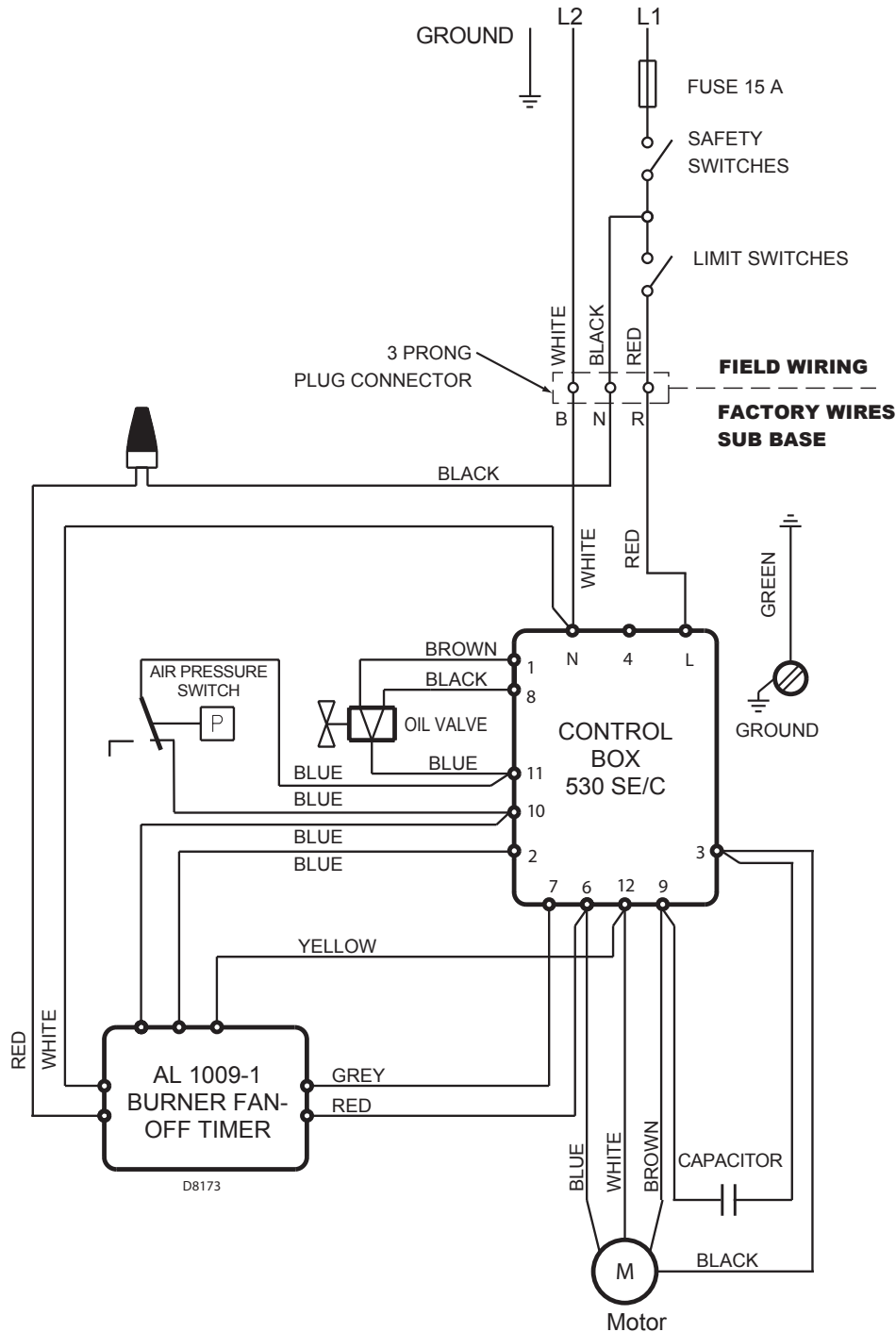


Figure 13 - Riello Wiring Diagram With Post Purge Timer And Blocked Flue Pressure Switch Safety

The safety switch in the 530SE CONTROL BOX is equipped with a contact allowing remote sensing of burner lockout. The electrical connection is made at terminal 4 (o) on the SUB-BASE.

Should lockout occur the 530SE CONTROL BOX will supply a power source of 120VAC to the connection terminal. The maximum allowable current draw on this terminal (4) is 1 Amp.



! WARNING

If a neutral or ground lead is attached to terminal 4, the CONTROL BOX on the burner will be damaged should lockout occur.

NX Burner With Blocked Vent Safety (BVS) Operation	
External Action	Appliance Response
Power applied to burner control	Internal safety check conducted. If no light or flame is detected and all internal conditions are correct, control enters idle mode.
Thermostat Calls For Heat	<ol style="list-style-type: none"> 1. Contacts between T and T on Aquastat L7248A are closed. 2. Burner Control period (4 seconds) internal and external check for flame or light. If flame is detected, control remains in idle mode. 3. When flame is not present, Burner Control will apply power to the burner motor and igniter, complete a 15 second valve on delay period and then apply power to the oil valve circuit. 4. Burner Control enters the trial for ignition period. <ol style="list-style-type: none"> A. Monitors burner for flame. B. When flame is not detected: <ol style="list-style-type: none"> I. Enters lockout mode after 15 seconds. II. Shuts off valve, igniter and burner motor. III. Flashes indicator light at 1 Hz (½ second on, ½ second off). IV. Depress reset button to return to power up sequence. C. When flame is detected, Carry-Over period begins: 5. Burner Control enters 10-second Ignition Carry-Over period. <ol style="list-style-type: none"> A. Turns on indicator light B. If flame is lost and lockout time has not expired, Burner Control returns to trial for Ignition period. C. If flame is lost and lockout time has expired, Burner Control enters Recycle Mode. 6. Carry-over time expires and igniter turns off. 7. Enters a run mode: <ol style="list-style-type: none"> A. Flame is monitored until call for heat ends or flame is lost. If flame is lost: B. Control enters Recycle Mode. <ol style="list-style-type: none"> I. Recycle time starts (60 seconds). II. Burner and valve are turned off. III. Indicator light flashes at ¼ Hz (2 seconds on, 2 seconds off). IV. Returns to Idle mode at end of Recycle mode.
Call for heat is satisfied.	<ol style="list-style-type: none"> 1. Oil valve circuit is de-energized and valve shuts off. 2. Burner motor runs for selected post purge time. 3. Burner motor turns off. 4. Burner Control returns to Idle mode
Reset button pushed two times without device completing a call for heat.	<ol style="list-style-type: none"> 1. Burner Control enters restricted mode. 2. Indicator light flashes 1 Hz (½ second on, ½ second off). 3. Reset device by pressing and holding reset button for a minimum of 45 seconds.

GeniSys 7505 Reset Button Operations			
Pushing the reset button in the current state will cause the following conditions:			
If the burner state is:	Pushing the reset button < 1 second	Pushing the reset button > 1 second	Push, hold reset button >15 seconds
Lockout	Reset from Soft Lockout		Reset from Restricted (Hard) Lockout
Valve On Delay, Trial For Ignition, Ignition Carryover	Pump Prime	Disable the Burner. Any time the burner is running, press and hold the reset button to disable the burner. The burner will remain off as long as the button is held.	Enables pump priming: After the reset button has been held for 15 seconds the button can then be clicked during the next ignition sequence to enter pump prime mode.
Run (igniter is shut off)	Yellow light flashes to indicate cad cell resistance.		
Motor-Off Delay, Standby	No action		
Pump Prime	No action	Exit pump prime mode and return to standby.	
Status Lights			
Light Color	On Continuously	Flashing	
Red	Restricted (Hard) Lockout	Soft Lockout	
Green	Flame Sense during normal operation. May be stray light during standby.	Recycle	
Yellow	Control is in Pump Prime mode OR reset button is currently held for >15 seconds.	Cad cell resistance.	

Beckett NX BURNER TROUBLESHOOTING

Condition 1: Burner motor does not start when there is a call for heat.

Procedure	Status	Corrective Action
1. Check that limit switches are closed and contacts are clean.	N/A	N/A
2. Check for line voltage power at the oil primary control. Voltage should be 120 Vac between the black and white lead wires on the oil primary control.	N/A	N/A
3. Check indicator light with burner off, no call for heat (no flame).	Green Indicator light is on.	Cad cell is defective, sees external light, or connections have shorted. Go to step 4.
	Green Indicator light is off.	Go to step 6.
4. Shield cad cell from external light.	Green Indicator light turns off.	Eliminate external light source or permanently shield cad cell.
	Green Indicator light stays on.	Replace cad cell with new cad cell and recheck. If indicator light does not turn off, remove cad cell lead wires from Aquastat and recheck. If indicator light is still on, replace the Aquastat control. If the indicator light turns off, replace cad cell bracket assembly.
5. Verify that the oil valve is closed during the "valve on delay" period by observing the view port and verifying that no flame is present during the 15-second "valve on delay".	Green Indicator light is on.	If flame is present, replace the oil valve.
6. Jumper thermostat (T -T) terminals on Aquastat IMPORTANT First remove one thermostat lead wire.	Burner starts.	Trouble is in thermostat circuit. Check thermostat-wiring connections. If connections are clean and tight, check thermostat wires for continuity.
	Burner does not start.	<ul style="list-style-type: none"> • Disconnect line voltage power and open line switch. • Check all wiring connections.
		<ul style="list-style-type: none"> • Tighten any loose connections and recheck. • If burner still doesn't start, replace Aquastat.
		If burner still doesn't start, check the oil burner motor. It may be seized or burned out.

Condition 2: Burner starts then locks out on safety with red indicator light flashing.		
Procedure	Status	Corrective Action
1. Reset oil primary control by pushing in and releasing red reset button.	Indicator light stops flashing.	Go to Step 2.
	Indicator light continues to flash at 1/2 second on, 1/2 second off rate.	Verify that the control is not in restricted mode. (See notes at end of this table.). If not in restricted mode, replace Aquastat
2. Listen for spark after burner turns on (after 2 second delay).	Ignition is off	Spark igniter could be defective. Check for line voltage at igniter terminals. If line voltage is present, replace R7484.
	Ignition is on.	Go to Step 3.
	Ignition is on but no oil is being sprayed into the combustion chamber.	Wait for "Valve ON" delay to complete. Check oil supply. Ensure BVS bypass contact close and bypass pressure switch for 10-seconds. After 10-seconds, check pressure switch on BVS to ensure closed. Pressure switch open. Check pressure tubes for proper connection or possible obstructions. Check venting for blockage. Check combustion air intake for blockage. Check pressure switch operation. Check oil line valve. Check for filter blockage or seized oil pump.
3. Check indicator light after flame is established, but before oil primary control locks out.	Indicator light is on until the control locks out and starts flashing during lockout.	Check Aquastat
	Indicator light stays off.	Go to step 4.
4. Check cad cell sighting for view of flame. • Disconnect line voltage power and open line switch. • Unplug cad cell and clean cad cell face with soft clothe. Check sighting for clear view of flame. Replace cad cell in socket. • Reconnect line voltage power and close line switch. • Start burner.	Burner locks out.	Go to step 5.
	Burner keeps running.	System is OK.
5. Check cad cell. • Disconnect line voltage power and open line switch. • Remove existing cad cell and replace with new cad cell. • Disconnect all wires from thermostat terminals to ensure that there is no call for heat. • Reconnect line voltage power and close line switch. • Expose new cad cell to bright light such as a flashlight.	Indicator light is on.	Remount control onto burner housing. Go to step 6.
	Indicator light is off.	Go to step 6.
6. Check cad cell bracket assembly. • Disconnect line voltage power and open line switch. • Remove cad cell wires from quick connect connectors on the Aquastat and leave control lead wires open. • Apply power to device. • Place jumper across cad cell terminals after burner motor turns on.	Indicator light is on.	Replace cad cell bracket assembly.
	Indicator light is off.	Replace Aquastat.
NOTE: Restricted Mode - (Limited Reset): In order to limit the accumulation of unburned oil in the combustion chamber, the control can be reset only 3 times, after which, the control locks out. The reset count returns to zero each time a call for heat is successfully completed. To reset from Restricted Mode: press and hold the reset button for 30 seconds. When the LED flashes twice, the device has reset.		
NOTE: Disable function: Pressing and holding the reset button will disable all functions until the button is released. The burner will restart at the beginning of the normal heat cycle on safety check.		

Beckett NX: System and General Troubleshooting		
Problem	Possible Cause	Remedy
Boiler will not start.	Thermostat not calling for heat.	<ul style="list-style-type: none"> Check thermostat and adjust. Also, check thermostat for accuracy; if it is a mercury switch type, it might be off level.
	No power to Boiler.	<ul style="list-style-type: none"> Check Boiler switch, main electrical panel Boiler fuse or circuit breaker. Also look for any other hand operated switch, such as an old poorly located Boiler switch, which was not removed during Boiler replacement.
	Thermostat faulty.	<ul style="list-style-type: none"> Remove thermostat wires from control terminals T-T. Place a jumper across T-T. If Boiler starts, replace thermostat, thermostat sub-base (if equipped), or both.
	Oil primary control faulty.	<ul style="list-style-type: none"> Check reset button on oil primary control.
	Photo Cell wiring shorted or room light leaking into photo cell compartment	<ul style="list-style-type: none"> Check photocell (cad cell) wiring for short circuits. Also, check for room light leaking into cad cell compartment. Repair light leak if necessary. See Table C-3.
	Open safety switch.	<ul style="list-style-type: none"> Check for open limit or auxiliary limit. Also, check internal wiring connections; loose connectors, etc.
Boiler will not start without first pushing oil primary control reset button. (Happens on frequent basis)	Photo Cell (Cad Cell) defective.	<ul style="list-style-type: none"> If cad cell is dirty, clean it. (Determine why cad cell is getting dirty). If cad cell is poorly aimed, realign it. NOTE: The photocell should have a resistance of 100KΩ in absence of light; a maximum of 1500Ω in the presence of light. Ensure that room light is not leaking into the cad cell compartment. (See diagnostic light section).
	No fuel oil.	<ul style="list-style-type: none"> Check fuel oil supply. Check that all hand operated fuel oil valves are in the open position. Fill oil storage tank if necessary.
	Clogged nozzle.	<ul style="list-style-type: none"> Replace nozzle with high quality replacement. Use rating plate or Tables in Appendix A as a guide.
	Clogged oil filter.	<ul style="list-style-type: none"> Replace oil tank filter or in-line filter if used.
	Blocked Vent Safety Circuit opening.	<ul style="list-style-type: none"> Pressure switch open: Check pressure tubes for proper connection or possible obstructions. Check venting for blockage. Check combustion air intake for blockage. Check pressure switch operation.
	Low oil pump pressure.	<ul style="list-style-type: none"> Connect pressure gauge to oil pump. Adjust pump pressure, or replace oil pump if necessary. Ensure that erratic pressure readings are not caused by defective fuel oil line.
	Air getting into fuel oil lines, or fuel oil line dirty, clogged, or in some manner defective.	<ul style="list-style-type: none"> Check fuel oil lines. Replace any compression fittings found with high quality flared fittings. Check for any signs of oil leaks. Any oil leak is a potential source of air or contaminants.
Defective burner motor.	<ul style="list-style-type: none"> Check burner motor. If burner motor is cutting out on over-load, determine why. Replace if necessary. 	
Boiler starts, but cuts out requiring manually resetting the oil protector reset button	No fuel oil.	<ul style="list-style-type: none"> Check fuel oil supply. Check that all hand operated fuel oil valves are in the open position. Fill oil storage tank if necessary.
	Clogged nozzle.	<ul style="list-style-type: none"> Replace nozzle with high quality replacement. Use rating plate or Tables in Appendix A as a guide.
	Clogged oil filter.	<ul style="list-style-type: none"> Replace oil tank filter or in-line filter if used.
	Blocked Vent Safety Circuit opening.	<ul style="list-style-type: none"> Check pressure switch on BVS to ensure closed. Pressure switch open. Check pressure tubes for proper connection or possible obstructions. Check venting for blockage. Check combustion air intake for blockage. Check pressure switch operation.
	Low oil pump pressure.	<ul style="list-style-type: none"> Connect pressure gauge to oil pump. Adjust pump pressure, or replace oil pump if necessary. Ensure that erratic pressure readings are not caused by defective fuel oil line.
	Air getting into fuel oil lines, or fuel oil line dirty, clogged, or in some manner defective.	<ul style="list-style-type: none"> Check fuel oil lines. Replace any compression fittings found with high quality flared fittings. Check for any signs of oil leaks. Any oil leak is a potential source of air or contaminants.
	Defective burner motor.	<ul style="list-style-type: none"> Check burner motor. If burner motor is cutting out on over-load, determine why. Replace if necessary.
	Water or contaminants in oil.	<ul style="list-style-type: none"> Drain fuel oil storage tank, replace fuel oil. (Consult with fuel oil supplier).

Beckett NX: System and General Troubleshooting		
Problem	Possible Cause	Remedy
Oil burner sputtering at nozzle	Electrodes out of adjustment or defective.	<ul style="list-style-type: none"> Check electrode settings. Check electrodes for dirt build-up or cracks in porcelain.
	Poor transformer high voltage connections or defective transformer.	<ul style="list-style-type: none"> Check contacts between the igniter and electrodes. If OK, replace the igniter
	Fuel oil filter clogged.	<ul style="list-style-type: none"> Replace fuel oil storage tank filter and / or fuel oil in-line filter.
	Defective oil pump.	<ul style="list-style-type: none"> Check burner motor / fuel oil pump coupling. Check oil pump pressure. Replace fuel oil pump if necessary.
	Fuel oil line partially clogged or contains air.	<ul style="list-style-type: none"> Bleed air from oil line. If problem persists, replace oil line.
	Blocked Vent Safety Circuit opening intermittently. (Boiler lights, then turns off)	<ul style="list-style-type: none"> Check pressure switch on BVS to ensure it remains closed. Pressure switch open. Check pressure tubes for proper connection or possible obstructions. Check venting for blockage. Reduce burner head opening. Check combustion air intake for blockage. Check pressure switch operation.
Excessive fuel oil consumption.	Fuel oil leak.	<ul style="list-style-type: none"> Check fuel oil line for leaks. Repair or replace if necessary.
	Thermostat improperly adjusted or in poor location.	<ul style="list-style-type: none"> Check thermostat heat anticipator setting against measured amperage draw. Increase heat anticipator setting if necessary. If the thermostat is being influenced by drafts, sunlight, duct work, etc., relocate to more suitable location.
Too much smoke.	Insufficient combustion air adjustment at oil burner, or improper draft pressure.	<ul style="list-style-type: none"> Check CO₂. Should be 11.5% to 12%
	Heat exchanger partially clogged.	<ul style="list-style-type: none"> Check for soot build-up in heat exchanger flue passages, especially in the outer radiator.
Soot building up on blast tube (end coning).	Flame impingement caused by incorrect nozzle angle.	<ul style="list-style-type: none"> Check nozzle size and angle. (See Appendix A). Check distance from head to inside surface of the fire pot.
Boiler will not warm home to desired temperature.	Thermostat adjustments or location.	<ul style="list-style-type: none"> Check thermostat heat anticipator setting against measured amperage draw. Increase heat anticipator setting if necessary. If the thermostat is being influenced by drafts, sunlight, duct work, etc., relocate to more suitable location.
	Insufficient water flow.	<ul style="list-style-type: none"> Check all registers.
	Defective high limit control.	<ul style="list-style-type: none"> Test high limit function of all limit switches. Use a duct thermometer to assess accuracy of limit control. Replace control if necessary.
	Under-sized nozzle.	<ul style="list-style-type: none"> Check nozzle and nozzle filter for dirt.
Home does not heat evenly	Boiler motor stopping intermittently on overload.	<ul style="list-style-type: none"> Check burner motor. Pressure switch opening due to blocked vent. Replace if necessary.
	Improper distribution of heat.	<ul style="list-style-type: none"> This is not likely to be a Boiler problem. Balance duct system.

Riello 40BF blocked vent safety (BVS) Operation	
External Action	Appliance Response
Thermostat calls for heat.	<ul style="list-style-type: none"> • Burner enters pre-purge. • After pre-purge, oil valve is energized and burner lights off. • Burner operates in run mode. • Normally closed pressure switch monitors for vent or combustion air intake blockage.
Call for heat is satisfied.	<ul style="list-style-type: none"> • Oil valve circuit is de-energized and valve shuts off. • Burner motor runs for duration of burner motor-off delay. • Burner motor turns off.
Pressure switch contacts open and cause burner to re-cycle.	<ol style="list-style-type: none"> 1. Check for vent blockage. 2. Check for combustion air intake blockage. 3. Ensure pressure tubes are connected properly and clear of obstructions. 4. Check burner set up.

RIELLO 40BF BURNER TROUBLESHOOTING		
Condition: Thermostat is calling for heat. Burner is not running.		
Problem	Possible Cause	Remedy
Reset control box.	Burner starts.	Go to step #3
	Burner does not start	Go to step #1
1. Test for 120 Vac supply at sub-base between L (P) & N or terminals #3 and #5.	120 Vac present.	Go to step #2
	No voltage	<ul style="list-style-type: none"> • Check system fuse, breaker or ensure service switch is ON. • Verify all limits are closed. • If using switching relay, verify 24 Vac at T-T. • Verify BVS pressure switch is closed.
2. Turn off power supply- Remove control box and jumper terminals #5 and #6. Restore power.	Motor runs.	<ul style="list-style-type: none"> • Verify reduced voltage (42-52 Vac) between terminals #3 and #7. • Ensure good contact between control box spades and sub-base terminals. • Defective control box/ Replace.
	Motor does not run.	<ul style="list-style-type: none"> • Verify electrical connections. • Check for seized pump, motor, or fan against housing. • Defective motor capacitor. • Thermal overload (Hot motor).
3. Burner Starts	Burner stays in Pre-purge.	<ul style="list-style-type: none"> • Faulty CAD cell or seeing light before trial for ignition. • Coil wires on terminals #1 and #2 or #1 and #8 reversed. • Open coil circuit; terminals #2 and #8. • Open coil circuit; terminal #1 • Defective 42-52 Vac supply, terminals #3 and #7. • Defective control box/ Replace
	Burner continues to purge and light off with immediate flame dropout.	<ul style="list-style-type: none"> • Metal yoke for coil missing. • Coil wire #2 and #8 reversed. • Low resistance of coil holding circuit, terminals #1 and #2, (1350 ohms \pm 10%). • Verify BVS pressure switch is remaining closed upon light off.
	Burner locks out after trial for ignition.	<ul style="list-style-type: none"> • Low resistance or no contact on starting circuit of coil, terminals #2 and #8. (1.3-ohm \pm %) • No oil supply- tank empty, valve closed, dirty filter, damaged supply lines. • Defective or dirty oil valve stem, nozzle, or pump strainer. • Broken pump drive key, defective pump or no oil pressure. • Ignition electrodes shorted, cracked porcelain. • Burner motor not up to speed. • Excessive draft over fire. • Defective control box/ Replace.
4. Burner Runs, post purge successful. Aquastat Shows Error EE4.	Some Aquastats limit post purge time to 1 minute. Error unique to early models of L7248.	<ul style="list-style-type: none"> • Reset Post purge timer on Fan Timer Board to 45 seconds.

RIELLO 40BF Blocked Vent safety system (BVS) TROUBLESHOOTING

Condition: Thermostat is calling for heat. Burner is not running.

Problem	Possible Cause	Remedy
Test BVS pressure switch contacts are closed.	Contacts closed.	Go to step #2.
	Contacts open	Verify pressure tubing is connected properly and clear of obstructions. Verify vent is not obstructed. Verify combustion air intake is not obstructed. Replace.
Turn off power supply- Remove control box and jumper terminals #5 and #6. Restore power.	Motor runs.	Verify reduced voltage (42-52 Vac) between terminals #3 and #7. Ensure good contact between control box spades and sub-base terminals. Defective control box/ Replace.
	Motor does not run.	Verify electrical connections. Check for seized pump, motor, or fan against housing. Defective motor capacitor. Thermal overload (Hot motor).
Burner Starts	Burner stays in Pre-purge.	Faulty CAD cell or seeing light before trial for ignition. Coil wires on terminals #1 and #2 or #1 and #8 reversed. Open coil circuit; terminals #2 and #8. Open coil circuit; terminal #1 Defective 42-52 Vac supply, terminals #3 and #7. Defective control box/ Replace
	Burner continues to purge and light off with immediate flame dropout.	Metal yoke for coil missing. Coil wire #2 and #8 reversed. Low resistance of coil holding circuit, terminals #1 and #2, (1350 ohms \pm 10%). Verify BVS pressure switch is remaining closed upon light off.
	Burner locks out after trial for ignition.	Low resistance or no contact on starting circuit of coil, terminals #2 and #8. (1.3-ohm \pm %) No oil supply- tank empty, valve closed, dirty filter, damaged supply lines. Defective or dirty oil valve stem, nozzle, or pump strainer. Broken pump drive key, defective pump or oil pressure. Ignition electrodes shorted, cracked porcelain. Burner motor not up to speed. Excessive draft over fire. Defective control box/ Replace.

HOMEOWNER'S REFERENCE TABLE

Model No.

Serial No.

Date Installed

Contractor

Contact

Address

Postal Code

Telephone No.

After Hours No.

FUEL SUPPLIER

Fuel Oil Supplier

Contact

Telephone No.

After Hours No.

IF DIFFERENT FROM INSTALLATION CONTRACTOR:

Service Tech.

Telephone No.

After Hours No.
