Olsen
Heating & Cooling Products

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BCL-S BFL
(Lowboy Model)
BCL
(High Capacity Lowboy Model)

Oil Fired Warm Air Furnaces

INSTALLATION, OPERATION & MAINTENANCE MANUAL

C US

ecr

An ISO 9001-2008 Certified Company

ECR International
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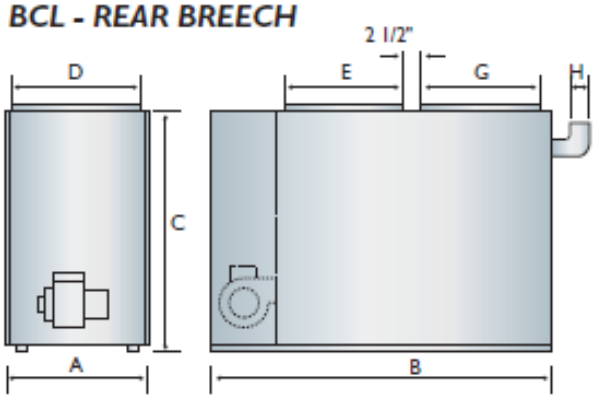
web site: www.ecrinternational.com

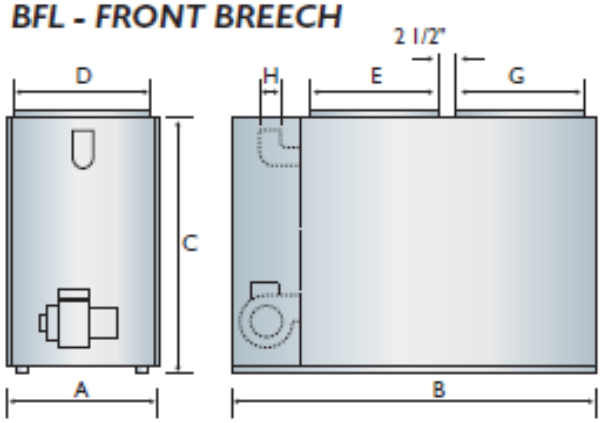
P/N# 28141, Rev. H [03/2014]

Dimensions

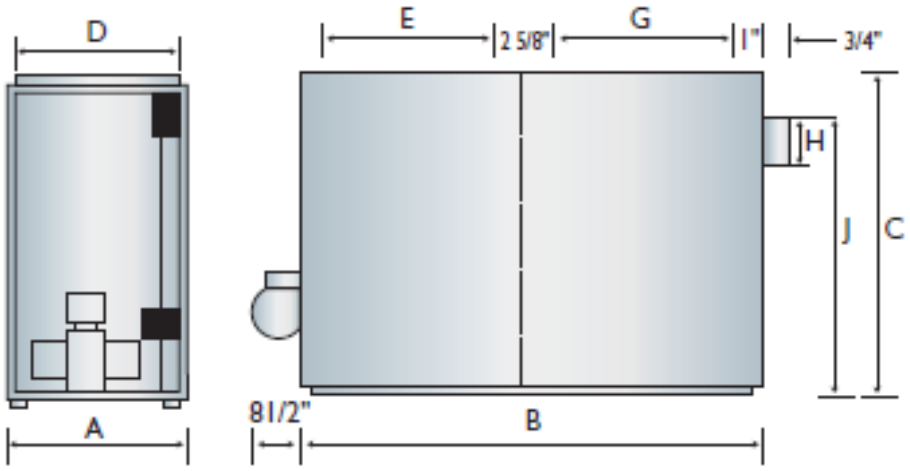
BCL - REAR BREECH



BFL - FRONT BREECH



BCL 190/225 REAR BREECH



Furnace Model	Cabinet			Plenum Openings		Flue		Filter (Permanent)	Shipping Weight (LB)
	Width A	Length B	Height C	Supply D x E	Return F x G	Diameter H	Height J		
BCL-S	22	51½	41	20½ x 18⅝	20½ x 18⅝	6	37¼	20 x 25 x 1	280
BFL	22	51½	41	20½ x 18⅝	20½ x 18⅝	6	38¼	20 x 25 x 1	250
BCL High Capacity	26	49	56	24 x 22	24 X 22	7	47	20 x 25 x 1 (2)	390

Contents

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1. General

Furnace installation shall be completed by qualified agency. See glossary for additional information.

⚠ WARNING

Fire, explosion, asphyxiation and electrical shock hazard. Improper installation could result in death or serious injury. Read this manual and understand all requirements before beginning installation.

⚠ WARNING

Fire, burn, asphyxiation hazard. Do not use gasoline, crank case oil, or any oil containing gasoline. Failure to follow these instructions could result in death or serious injury.

2. Safety Symbols

Become familiar with symbols identifying potential hazards.

This is the safety alert symbol. Symbol alerts you to potential personal injury hazards. Obey all safety messages following this symbol to avoid possible injury or death.

⚠ DANGER

Indicates a hazardous situation which, if not avoided, WILL result in death or serious injury

⚠ WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Used to address practices not related to personal injury.

3. Introduction

- **Models BCL (90, 100, 120, 130, 145) S**
  BCL-S models are rear breech oil fired forced air lowboy furnaces with output capacity range of 90,000 to 141,000 Btu/hr.
- **Models BFL (90, 100, 120, 130, 145)**
  BFL models are front breech oil fired forced air lowboy furnaces with output capacity range of 88,000 to 139,000 Btu/hr.
- **Models BCL (170-2, 190, 200, 225)**
  BCL models are rear breech high capacity oil fired forced air lowboy furnaces with output capacity range of 177,000 to 237,000 Btu/hr. Shipped in two pieces; furnace section and blower section, which are assembled together at the installation site.

Furnace models are either factory equipped for chimney venting or factory equipped for direct venting.

Chimney vent models and direct vent models are not field convertible. Direct vent installation instructions are included with the direct vent models.

Installation shall conform to requirements of authority having jurisdiction or in absence of such requirements:

- Canada - CAN/CSA - B139, Installation Code for Oil-Burning Equipment.
- United States - National Electrical Code, NFPA31, Standard for the Installation of Oil-Burning Equipment.

Models are CSA listed, (NRTL/C) for use with No. 1 (Stove) and No. 2 (Furnace) Oil.

Refer to tables in Appendix A for performance data.

4. Heat Loss

Maximum hourly heat loss for each heated space shall be calculated in accordance with the procedures described in the manuals of:

- Canada - The Heating, Refrigeration and Air Conditioning Institute of Canada (HRAI), or by other means prescribed, or approved by the local authority having jurisdiction.
- United States - Manual J. titled, "Load Calculation" published by the Air Conditioning Contractors of America, describes a suitable procedure for calculating maximum hourly heat loss.

5. Locating the Unit - [See Table 1]

- Locate furnace so flue connection to chimney is short, direct and consists of as few elbows as possible.
- Centralize furnace location with respect to supply and return air ductwork. Central location minimizes trunk duct sizing.
- All models may be installed on combustible floors.

6. Furnace Used In Conjunction With Air Conditioning

- Install furnace in parallel with or upstream from evaporator coil to avoid condensation in heat exchanger.
- When installed in parallel, prevent chilled air from entering furnace by use of dampers or air controlling.
- Manually operated dampers must have a control to prevent operation of either system unless dampers are in full heat or full cool position.
- Air heated by the furnace shall not pass through evaporator coil unless coil is specifically approved for such service.
- Check and adjust blower speed to compensate for pressure drop caused by evaporator coil.

Table 1: Minimum Installation Clearances

Location	Clearance to Combustibles (Inches)	
	BCL-S and BFL	BCL High Capacity
Top	1	3
Bottom	0	0
S/A Plenum	1	3
Rear	6*	24
Side 1	6*	6***
Side 2	24	18
Front	24	24
Flue Pipe	9**	9**
Enclosure	Standard	Standard

* 24 Required Service Clearance

** 18 in USA

*** Required on one side only for service to rear

7. Combustion Air

- Furnace installed in a closet or utility room, provide two openings connecting to well-ventilated space (full basement, living room or other room opening, not a bedroom or bathroom).
  A. One opening shall be located above level of upper vent opening.
  B. One opening below combustion air inlet opening in front of furnace.

  Each opening shall have a minimum free area of 1½ square inches per 1,000 Btu/h of total input rating of all appliances installed in the room.
- For furnaces located in buildings of unusually tight construction, such as those with high quality weather stripping, caulking, windows and doors, or storm sashed windows, or where basement windows are well sealed, a permanent opening communicating with a well ventilated attic or with the outdoors shall be provided, using a duct if necessary. The duct opening shall have a free area of 1½ square inches per 1,000 Btu/h of total input rating of all appliances to be installed.
- Furnace installed in a full basement, infiltration is normally adequate to provide air for combustion and draft operation.
- Furnace rooms under 65m³ (700 ft³) should automatically be treated as confined space.

8. Chimney Venting

- Flue pipe should be as short as possible with horizontal pipes sloping upward toward the chimney at a rate of one-quarter inch per foot.
- Flue pipe should not be smaller in cross sectional area than flue collar on the furnace.
- Flue pipe should connect to chimney so the flue pipe extends into, and terminates flush with the inside surface of chimney liner. Seal the joint between pipe and lining.
- Chimney outlet should be at least two feet above highest point of peaked roof.
- All unused chimney openings should be closed.
- Chimneys must conform to local, provincial or state codes, or in the absence of local regulations, to the requirements of the National Building Code.

NOTICE

This furnace is approved for use with Type L vent or equivalent. Maximum vent temperature for Type L vent is 575°F (300°C).

⚠ WARNING

Asphyxiation hazard. Chimney vented versions of furnace must be connected to flue having sufficient draft at all times. Failure to follow these instructions could result in death or serious injury.

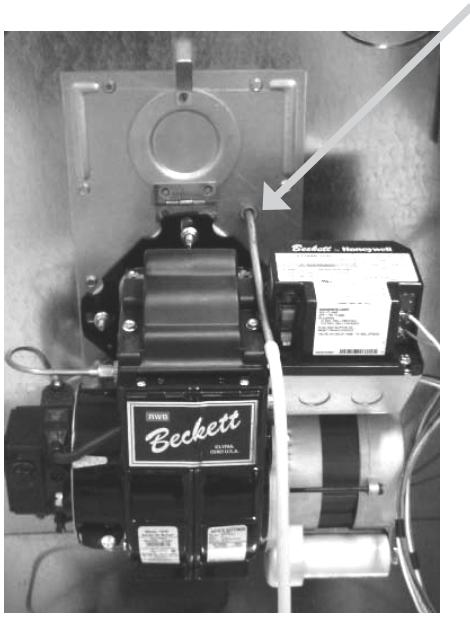
Manufacturer recommends over fire draft of -0.02 in. w.c. See Figure 2.

Flue pipe must not pass through any floor or ceiling, may pass through a wall where suitable fire protection provisions have been installed.

- Refer to CAN/CSA B-139 for rules governing the installation of oil burning equipment.
- United States, refer to NFPA 31 for regulations governing the installation of oil burning equipment.

See Appendix A for burner set-up.

Figure 2 - Check Over-Fire Draft



Over-fire draft access port.

9. Barometric Damper Control

Barometric damper control, also known as draft regulator, is used on conventional chimney venting only. Control automatically maintains constant negative pressure. Ensures proper pressures are not exceeded. If chimney does not develop sufficient draft, draft control does not function properly.

- Install draft regulator in same room or enclosure as furnace. Draft regulator should not interfere with combustion air supplied to the burner.
- Locate control near furnace flue outlet.
- Install per instructions supplied with regulator.
- Set over fire draft, measured at oil burner mounting plate over-fire draft access port, to -0.02 in. w.c. See Figure 2 page 6.

10. Optional Side Wall Venting

Certain BCL-S and BFL furnace models are manufactured as sidewall vented units. Refer to Direct Venting Instructions, P/N 240006979 included with Vent Kit for details.

Sidewall Venting (*Direct Venting*) requires use of specific oil burners; Beckett AFII.

Refer to Appendix A, Table A2.

11a. Models with Electronic Fan Timer Control and Snap-Disc Limit Control (See Figure 3)

Electronic Fan Timer integrates control of burner and circulator fan operations. Control is central wiring point for most of furnace electrical components.

- United Technologies 1158-120 has an adjustable fan on time set by selecting dipswitch combination displayed in Chart 1. Fan on delay can be set at 30, 60, 90 or 120 seconds. Provides a delay between burner ignition and blower start-up to eliminate excessive flow of cold air when blower comes on.
- United Technologies 1158-120 has an adjustable fan off time of 2, 3, 4 or 6 minutes as displayed in Chart 1. Fan off delay time starts when burner motor is de-energized at end of call for heat. Blower shutdown is delayed to remove any residual heat from heat exchanger.
- Electronic fan timer board works in conjunction with snap disc limit controls, performing a safety function, and breaks power to oil burner primary control, shutting off burner if furnace over-heats.
- Limit control is thermally operated and automatically resets. Limit control is factory installed, pre-set and is not adjustable.
- If limit control opens with United Technologies 1158-120 electronic fan control**,** circulating fan will energize. When limit closes, fan off timer begins. At the end of fan off time cycle burner is energized, initiating normal burner cycle.

FIGURE 3: UNITED TECHNOLOGIES 1158-120 FAN TIMER BOARD

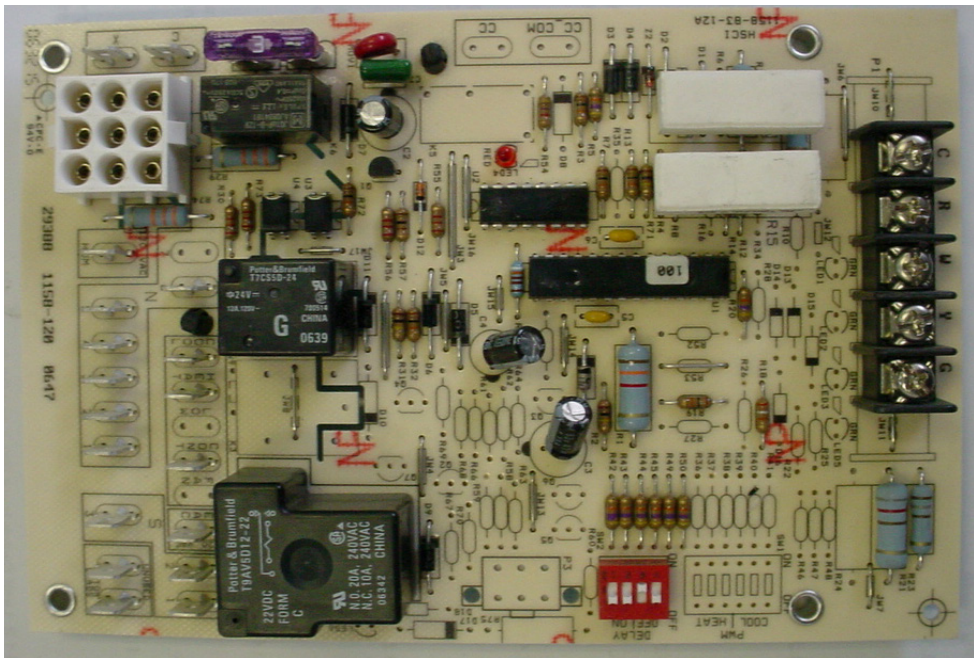


Chart 1- United Technologies 1158-120

Dip Switch Position				Blower Delay Times	
1	2	3	4	On Seconds	Off Minutes
Off	Off			30	
On	Off			60	
Off	On			90	
On	On			120	
		Off	Off		2
		On	Off		3
		Off	On		4
		On	On		6

11b. Models with Mechanical Fan And Limit Control

Furnace may be equipped with either Honeywell L4064B or White Rodgers 5D51 fan and limit control. Temperature sensitive fan switch is actuated by a helical bi-metal sensing element enclosed in a metal guard, and controls the circulating air blower. This provides a delay between burner ignition and blower start up to eliminate excessive flow of cold air when blower comes on.

Blower shutdown is also delayed to remove any residual heat from heat exchanger and improve annual efficiency of the furnace. Fan on settings of 110º F to 130º F (43º C to 55º C) and fan off settings of 90º F to 100º F (32º C to 37ºC) will usually be satisfactory.

Limit switch performs safety function and breaks power to oil burner primary control, which shuts off the burner if furnace over-heats. Limit control is thermally operated and automatically resets.

Limit control is factory installed, pre-set. Limit control incorporates a limit stop which prevents the limit switch from being set above the factory setting. Do not tamper with or attempt to adjust limit stop. The limit control should be set at or below the factory setting. ***DO NOT SET LIMIT CONTROL ABOVE FACTORY SETTINGS.***

Model	Factory Limit Control Setting
BCL-S	230°F
BFL	190°F
BCL High Capacity	200°F

Limit control and fan control are incorporated in same housing and are operated by the same thermal element.

12. Electrical Connections

- Furnace is listed by Canadian Standards Association under NRTL (North American) Standard.
- All field wiring shall conform to CAN/CSA C22.1 Canadian Electrical Code, Part 1, and by local codes, where they prevail.
- United States, wiring shall conform to National Fire Protection Association NFPA-70, National Electrical Code, and with local codes and regulations.
- Wire furnace to separate dedicated circuit in main electrical panel.
- Suitably located circuit breaker can be used as service switch, separate service switch is advisable.
- Service switch is necessary if circuit breaker is close to the furnace, or furnace is located between circuit breaker and entry to furnace room.
- Clearly mark service switch. Install in accessible area between furnace and furnace room entry. Locate so as to reduce possibility it can be mistaken as light switch or similar device.
- Power requirement is: 120 VAC, 1 Ø, 60 Hz.

Factory Equipped Blower	Amps
1/3 and 1/2 HP	12
3/4 HP Belt Drive and 1 HP Direct Drive	15
1 HP Belt Drive	20

- Accessories requiring 120 VAC power sources such as electronic air cleaners and humidifier transformers may be powered from furnace circuit, or from electronic fan timer board where provisions have been made for such connections, but should have their own controls.
- Do not use direct drive motor connections as a power source, there is risk of damaging accessories.
- Thermostat wiring connections are shown in wiring diagrams in Appendix B. Some micro-electronic thermostats require additional controls and wiring. Refer to thermostat manufacturer's instructions.
- Locate thermostat approximately 5 feet above floor, on inside wall, and where thermostat is exposed to average room temperatures. Avoid locations where thermostat is exposed to cold drafts, heat from nearby lamps and appliances, exposure to sunlight, heat from inside wall stacks, etc.
- Adjust thermostat heat anticipator to amperage draw of heating control circuit as measured at "R" and "W" terminals of thermostat. Do not measure current with thermostat connected to the circuit. Measure amperage by connecting ammeter between two wires which connect to thermostat "R" and "W" terminals.

13. Humidifier

- Humidifier is optional accessory available through most heating supplies outlets.
- Follow humidifier manufacturer's installation instructions
- Protect furnace heat exchanger from water or water droplets from humidifier.
- Do not use direct drive motor connections as source of power for 120 VAC humidifiers and humidifier transformers.

14. Piping Installation

- Install fuel system in accordance with requirements of CAN/CSA B-139, and local regulations.
- United States installation shall conform to NFPA No. 31 and local codes and authorities.
- Use only approved fuel oil tanks, piping, fittings and oil filter.
- Install oil filter as close to burner as possible.
- Refer to instructions and illustrations in oil burner and oil pump instructions shipped with the furnace.

15. Oil Filter

Install oil filter between fuel oil storage tank and oil burner. When using oil burner nozzle smaller than 0.65 U.S. Gallons Per Hour, install additional 7 to 10 micron filter as close as possible to oil burner.

16. Oil Burner Nozzles

Furnaces are certified for multiple firing rates. Furnace may be fired at ideal rate for wide range of structures by manipulating oil burner, nozzle, flame retention head, and temperature rise. Refer to Table A-1 thru A-3, and furnace rating plate to determine proper combinations.

17. Oil Burner Adjustment

- Adjust burner air supply to maintain fuel to air ratio to obtain ideal combustion conditions.
- Lack of air causes "soft" and "sooty" flames, resulting in soot build-up throughout heat exchanger passages.
- Excess combustion air causes bright roaring fire and high stack temperatures resulting in poor fuel efficiency.
- Furnaces operate most efficiently with No. 1 smoke spot on Bacharach Scale. Dust will eventually build up on air moving components of oil burner assembly resulting in decreased air supply with potential soot build up in flue gas passageways of heat exchanger. Soot behaves as insulator and impairs good heat transfer. Stack temperature increases, and efficiency decreases. To avoid this problem, adjust the air supply to provide no more than trace smoke spot on Bacharach Scale.
- See Venting Instructions included in Vent Kits for set-up details for sidewall vented furnaces.

NOTICE

Set up sidewall vented models to deliver zero (0) smoke.

NOTICE

Before operating furnace check burner alignment with combustion chamber. End cone of air tube must be centred to accommodating ring of combustion chamber. Adjust as necessary.

18. Burner Electrodes

Correct positioning of electrode tips with respect to each other, fuel oil nozzle, and burners is essential for smooth light ups and proper operation.

Refer to oil burner instructions provided with furnace and Appendix A Section A.2 for electrode specifications.

NOTICE

Do not tamper with furnace controls they are sensitive. If problems persist, call your service contractor.

19. Burner Primary (Safety) Control

Furnace is equipped with primary combustion control, also referred to as burner relay or burner protector relay, which uses a cad cell located in burner housing, to monitor and control combustion.

Dust or combustion residuals can build up on lens of cad cell impairing its response to flame. Check cad cell for cleanliness and proper alignment if primary control frequently shuts down combustion.

20. Combustion Chamber

Furnace is equipped with cerafelt combustion chamber, held in place by a retaining bracket.

Check the alignment of the combustion chamber and oil burner before firing. It is possible for the combustion chamber to shift if subjected to rough handling during transit.

Inspect combustion chamber for damage or carbon build up whenever oil burner is removed for repairs or routine maintenance.

⚠ WARNING

Fire, burn, asphyxiation hazard. Do not start the burner unless blower access door is secured in place. Failure to follow these instructions could result in death or serious injury.

21. Circulating Air Blower

- BCL-S and BFL furnace models may be equipped with either direct drive or belt drive blower systems.
- BCL high capacity furnace models are equipped with belt drive blower systems.
- All models are equipped with PSC blower motors.

Direct Drive Blower Systems

- Direct drive blower speed adjustments are not normally required in properly sized extended plenum duct systems. Motor RPM and air CFM delivery will vary automatically to accommodate conditions within usual range of external static pressures typical of residential duct systems.
- Under-sized duct systems may require higher blower speed to obtain system temperature rise.
- Some older duct systems were not designed to provide static pressure. They typically feature special reducing fittings at each branch run and lack block ends on the trunk ducts. These systems may require modification to provide some resistance to the airflow to prevent over-amping of direct drive blower motor. Selecting a lower blower speed may correct this problem.
- Direct drive blower speeds are adjusted by changing "hot" wires to motor winding connections. Refer to wiring diagrams in Appendix B or wiring diagram label affixed to furnace.
- ***Do not move neutral wire (normally white wire) to adjust blower speed.***
- Single blower speed for both heating and cooling modes may be used. Use a "piggy-back connector" accommodating both wires on a single motor tap.
- It is also acceptable to connect selected motor speed with a pigtail joined to both heating and cooling speed wires with a wire nut.
- Safety precaution against accidental disconnection of wires by vibration, secure wire nut and wires with few wraps of electricians tape.
- ***Do not connect power leads between motor speeds. Always connect neutral wire to motor's designated neutral terminal.***
- If joining blower speed wiring is done in furnace junction box, tape off both ends of unused wire.
- ***Do not use blower speed wires as source of power to accessories as electronic air cleaners and humidifier transformers. Unused motor taps auto-generate sufficiently high voltages to damage accessory equipment.***

Belt Drive Blower Systems

⚠ WARNING

Improper installation could result in death or serious injury. Belt drive components operate at high speeds and may snag loose clothing resulting in injury or death. Have a trained service professional preform the following instructions. Failure to follow these instructions could result in death or serious injury.

Belt drive blower systems can be modified for speed and air delivery by adjusting variable speed motor pulley and changing blower pulley.

- Adjust variable speed motor pulley by loosening 5/32 allen set screw in outer sheave. Turn outer sheave clockwise to increase blower speed, counter clockwise to reduce speed.
- Verify setscrew is tightened at one of the flat spots, failure to do so will convert the variable speed pulley to a fixed speed pulley by ruining the threads.
- Modify blower speed by changing the blower pulley. Smaller blower pulley will cause the blower to turn faster. Large pulley reduces blower speed.
- Large increases in the blower speed may increase power requirements.
- Check amperage draw of the blower motor after making changes. If amperage draw is greater than the value listed on the motor rating plate, replace with motor of higher horsepower.
- Deflection of 3/4 of an inch to 1 inch fan belt tension is necessary. Less deflection places a strain on the blower bearings and increases start up amperage draw.
- More deflection allows excess slippage and causes premature motor pulley wear.
- Automotive belt dressings are not recommended.
- Bar soap will work as belt dressing to reduce belt squeaks, etc. If using soap apply to the sides of belt only.

If operating belt drive blower at speeds above 1100 RPM, replace sintered bronze blower bearings with roller bearings.

Blower assembly in BCL (170-2/190/200/225) models with 1 HP blower is equipped with roller bearings.