

NCAT Asphalt Content Furnace - Exhaust Installation

INTRODUCTION

The Exhaust Installation for the AP-20 NCAT Asphalt Content Furnace requires specific sizes, materials and locations as described below. The installation location and local regulations may require adjustments to these requirements.

SAFETY

▲ WARNING: Failure to connect the furnace exhaust port to an appropriate, customer-supplied exhaust tube will result in smoke and gases escaping from the furnace and entering the work area.

▲ CAUTION: Do not connect the furnace exhaust port to tubing less than 3-inch inside diameter or otherwise restrict the exhaust flow from the furnace.

▲ CAUTION: Do not connect the exhaust tubing directly to an external fan or otherwise increase the velocity of the exhaust flow from the furnace.

▲ CAUTION: Restricting or increasing the exhaust flow from the furnace may damage the furnace or reduce its efficiency.

▲ CAUTION: The exhaust fumes exiting the furnace exhaust port may reach 270°C (518°F).

MATERIAL RECOMMENDATIONS

- 3in Inside Diameter (I.D.) seamless stainless steel tubing or electrogalvanized steel tubing with a maximum length of 10-feet

NOTE: 3in x 10ft (76mm x 3m), I.D. x L flexible electrogalvanized steel tubing is available from Gilson, Part Number [APA-36](#)

- The exhaust tubing length from the furnace output should be 10ft or less when using a 3-inch inside diameter tube
- If a 90° elbow is installed, add 1ft to the planned straight lengths for the exhaust tubing
- Optimal exhaust tubing installation has no bends or elbows, but this may not be practical at some locations. Bends restrict the exhaust air flow and tend to accumulate particulates which can also restrict air flow

ALTERNATIVE MATERIALS

- Alternative exhaust tubing materials cannot have a low melting point
- Alternative exhaust tubing materials cannot contain flammable materials
- Do not use tube with seams since these seams will leak fumes into the lab
- Alternative tubing may be up to 4in I.D.
- Use of 4in I.D. exhaust tubing may allow a longer tube length compared to the length limits for the 3in I.D. tubing
- A 3in to 4in I.D. tube connector or expander can be connected to the Exhaust outlet, then used 4-inch I.D. tubing to the Termination
- Alternative tubing may be double-walled with air or insulation in the space between tube-walls
- Double-wall exhaust tube may reduce the exterior temperature of the pipe (specific temperature reduction is not available)

LOCATION RECOMMENDATIONS

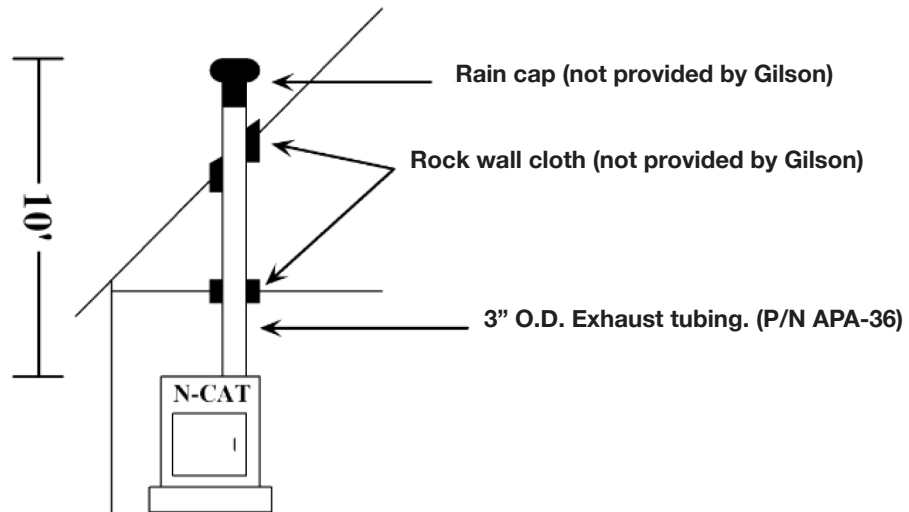
- Position the furnace so emissions are directed through metal exhaust tubing
- Exhaust tubing termination can be into a fume hood or other appropriate building ventilation system
- Furnace can be operated inside a fume hood, but do not connect furnace exhaust port to hood exhaust fan
- The room cannot be under 'negative' pressure caused by too much room air exhausted outside. open window or door to balance room air pressure
- All exhaust tube installations to the exterior of a building should have a weather cap to prevent any down-draft from occurring

INSTALLATION

1. Select a location to minimize exhaust tube length of 10ft or less if using 3in I.D. tubing.
2. Connect exhaust tubing to outlet of fan on top of cabinet.
 - Lightly seal tube-end connections with silicone sealant, such as DOW 832, or GE RTV 106, or equivalent for high-temperature service. Use sealant sparingly so the exhaust tube can be detached for cleaning and servicing
3. Minimize 90° bends in the exhaust tubing if possible. Bends restrict the exhaust air flow and tend to accumulate particulates which can also restrict air flow.
 - If a 90° elbow is installed, add 1ft to the planned straight lengths for the exhaust tubing
4. Termination of the exhaust tube may be in open air or into a larger exhaust duct or hood. Open air termination is the most efficient.
 - Exhaust tubing termination should not be in the vicinity of any fresh air intakes.
 - The weather cap must not restrict the air flow.
 - Insulate the exhaust tubing passing through ceiling and wall penetrations with rock-wall cloth or similar material rated to handle temperatures up to 270°C (518°F).
 - Connecting into a larger exhaust duct must not create positive air pressure into the exhaust termination which can diminish the furnace exhaust blower efficiency.
 - Do not connect the furnace exhaust port directly to an external fan with a rating of more than 60 Cubic Feet per Minute (CFM). If a direct connection is necessary, use a vacuum-break to avoid increasing airflow in the furnace exhaust system.
 - Increasing the velocity with a direct-connected external exhaust fan may increase the lift greater than -10 grams. This condition may blow fine-particles from the sample basket resulting in an exaggerated asphalt percent content
5. Turn on fume hood or other building exhaust blowers (if installed) and conduct “Lift Test” to ensure the -3.2 to -10 gram lift is maintained.
 - Perform the test with room door and/or window in open and closed positions to ensure proper makeup air is occurring in the room. (See “Lift Test Procedure” section).

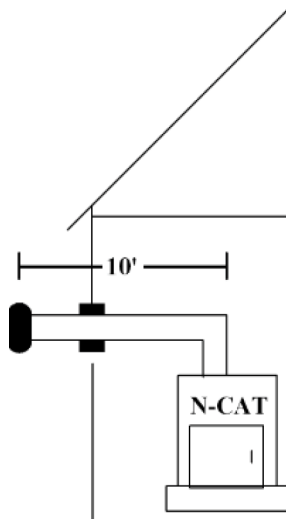
Following are illustrations showing examples of single and multiple furnace exhaust installations, the lift test procedure and notes about effect of negative air pressure on NCAT Asphalt Content Furnace.

Single Unit Installation Examples

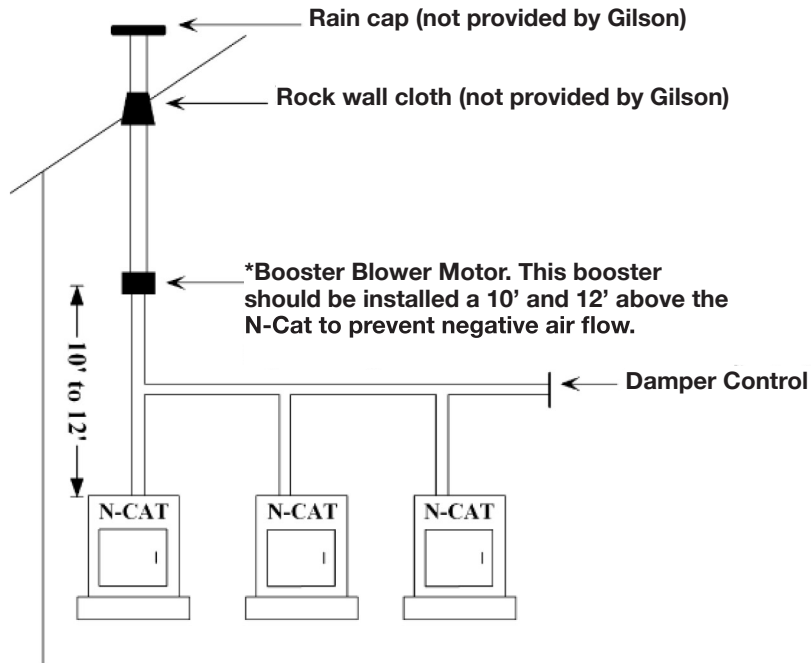


Note: Please consult a local HVAC technician for local building fire code requirements before installing.

Note: Gilson does not supply any materials for installation other than 3" O.D. exhaust tubing (P/N APA-36) sold as an accessory



Multiple Unit Installation Example



***Booster Blower Motor should have an ON/OFF toggle switch wired next to the N-Cat main control panel. The blower motor should only be activated with the toggle switch when a test is initiated with the N-Cat. Gilson does not offer a Booster Blower Motor. To size an additional booster blower more, please consult an HVAC technician.**

NOTE: Please consult a local HVAC technician for local building fire code requirements before installing.

NOTE: Gilson does not supply any materials for installation other than 3" O.D. exhaust tubing (P/N APA-36) sold as an accessory.

LIFT TEST PROCEDURE

- The efficiency of the furnace exhaust blower and building exhaust system is monitored by a quick procedure, referred to as the “lift test”.
- The lift test determines the air flow into and through the chamber, by lifting the load tray slightly which makes the scale display value between -3.2 and -10.0 grams.
- The correct air flow allows a complete combustion of the sample, producing accurate test results.
- If the lift is less than -3.2 grams, an incomplete combustion of the sample will occur, causing delays in the test.
- This low air flow may allow smoke to flow into the control compartment and room.
- If the lift is greater than -10 grams, fine-particles from the sample will be blown away and result in an exaggerated asphalt content percentage.

STEPS FOR A LIFT TEST:

1. Chamber must be at ambient (room temperature) condition before attempting a lift test. Allow the unit to cool to ambient condition. Close the door.
2. On control panel, turn the green power switch to ON. Allow the unit time to complete the normal scale display count-down from 9 to 0.
3. Press and release the “0” key on the keypad. This zeros the balance with the load tray installed.
4. Press and release the “start/stop” key on the keypad. This starts the exhaust blower motor.

The upper scale display will indicate a measurement approximately 20 seconds after pressing the “start/stop” key. The scale display will show the expected negative weight change, stabilize, then automatically Zero/Tare the value.

5. To view the achieved lift after the automatic Zero/Tare, press the stop button. This stops the Exhaust fan and stops the ‘lift’ of the hearth plate. The scale display now shows a positive value of this lift test.
6. Record the number on paper. The number should be between -3.2 and -10.0
7. Detach the exhaust tubing and repeat the test to determine if the exhaust tube is restricting the airflow or if the top plenum of the NCAT is restricting the airflow.

If Lift test results are out of range, see next section for effect of negative air pressure on the NCAT Asphalt Content Furnace, and verify correct installation as described above.

NEGATIVE AIR PRESSURE EFFECT ON NCAT ASPHALT CONTENT FURNACE

Air temperature and altitude have an impact on air pressure, and specifically impact the exhaust system on the NCAT Asphalt Content Furnace.

Negative air pressure refers to a “space” that has less atmospheric pressure exertion versus another. The “space” referred here is the room or building the NCAT is installed compared to the outside atmosphere. (Negative air pressure can also be thought of as a vacuum.)

If the outside atmospheric air pressure is greater than the room or building interior air pressure, you have a negative air pressure condition in the room or building.

The atmospheric pressure will attempt to offset the room or building pressure and equalize by entering the room through an open door, window or the exhaust termination of the NCAT Furnace.

The NCAT has a 60CFM rated blower motor for exhaust. In some situations, the atmospheric pressure difference is too great and the blower motor cannot overcome the external pressure.

In these situations, Smoke normally generated in the NCAT will fill the room and/or the lift test will be too low. These issues are caused by the design of the ventilation system in the buildings, not the fault of the NCAT.

There are a few options if the NCAT is installed at this type of location.

- Open any doors or windows in the room. This may be enough to offset the pressure differences, allowing the NCAT to be operated properly.
- Install a second blower motor in-line with the ventilation tubing from the NCAT. The second blower motor must be installed beyond the first 10 feet of exhaust tube. Gilson does not offer a selection of blower motors for this purpose. A motor would have to be purchased locally.
- Checking the buildings ventilation system. This is would require consulting a HVAC technician.