

GAS FLUES

and Masonry Chimneys

by Jim Buckley

Gas furnaces are more efficient than they used to be. The trick has been to extract more heat from the flue gasses before they are vented into the chimney. Some of the new furnaces have extracted so much heat that the exhaust temperature is less than 90 deg. F and can be power vented into plastic pipe. Others are a little less efficient (the so-called "Category II" appliances) which are vented into ordinary masonry chimneys or B-vent. All these venting systems have problems. The plastic pipe gets brittle and cracks, metal pipe corrodes, and condensation runs out through the butt joints of clay flues in ordinary masonry chimneys.

When the flue gasses enter the chimney at just over the dew point temperature, they cool down inside the chimney to below the dew point and condense into water and corrosive acids which eat through stainless steel, aluminum and galvanized flue liners and leak out through the butt joints of clay tile flues. It's not a little problem. More than one gallon of water, laced with sulfuric acid and hydrofluoric acid, is produced for every 100,000 BTUs of gas burned. In an ordinary house with a 150,000 BTU furnace it's like someone on the roof pouring a bucket of acid-water down the chimney every hour the furnace is running. Of course, some of the products of combustion exit the chimney as vapor, but the larger and cooler the flue, the more vapor that condenses.

The problem has been especially dramatic in masonry chimneys in which the flues are much too big for the new efficient gas furnaces. Typically a new furnace with a 4" vent is exhausted into an 8" by 12" tile flue liner at only 200 deg. F. As soon as this effluent enters the tile liner (which is five times too big) it cools down and slows down so that nearly all of the water and acids condense and run down the inside of the flue. It doesn't take long before this highly corrosive liquid eats out a mortar joint and soaks the surrounding masonry which is soon destroyed by repeated freeze/thaw cycles while the plaster walls inside become wet and discolored. Because most people don't understand what's happening, and erroneously assume they have a roof or flashing leak, lots of roofers have been sued after making unnecessary repairs. It's a big, common, aggravating problem.

Consequently, the gas furnace manufacturers and the gas utilities, through their representatives, the American Gas Association (AGA) and the Gas Research Institute (GRI), are spending lots of money trying to develop various metal and plastic flue liners that will withstand the corrosion and heat of the new high efficiency furnaces. Curiously, however, they do not seem to be considering ways to improve masonry chimneys.

A good solution would seem simple enough. If these new furnaces were vented into smaller 4" or 6" tile flue liners, most of the effluent would stay above the dew point and exit the chimney in vapor form. Shiplapped or belled joints in these smaller flues would keep any that did condense inside the liner. Round clay tile flue liners have been around a long time. They're cheap, acid resistant, durable, easy to install, safe and versatile enough to be used to vent incinerators, oil furnaces and solid fuel appliances, as well as all types of gas-fired appliances.