

Discontinuous-Annular ND-TLUD Burner (17.8 cm Diameter)

A discontinuous-annular pyrolytic gas burner was tested on a 17.8 cm diameter natural-draft top-lit updraft gasifier (ND-TLUD) burning hardwood twigs. The primary air enters through eight square 3 x 3 cm apertures arranged in a discontinuous annular ring. Secondary air enters from the chimney walls through eight rectangular 3 x 6 cm apertures that are directly above the annular holes. The purpose of this arrangement of gas holes was to improve the mixing of pyrolytic gas with secondary air at the base of the gas flame.



Figure 1. ND-TLUD (foreground).



Figure 2. Discontinuous annular burner on top.



Figure 3. Chimney with secondary air holes.



Figure 4. Burner operating.

A video of the test can be found on Youtube. <http://www.youtube.com/watch?v=01wc5VxpDFM>

There were gusts of wind that blew across the secondary air holes, but the burner remained lit. The gas fire was stable. Strong gusts of wind blew flamelets below the burner on the windward side, but this helped keep the burner lit when the wind dropped. However, even under strong gusts, the flamelets on the leeward side of the burner remained lit. Because the flame is in the center of the chimney, the metal does not get very excessively hot (e.g., it didn't burn off the paint or price tag).

In a smaller prototype, a swirling flame was created in the burner by rotating the annular gas ports by 45°.