

JUDGING FLAMES

Premix pilots are often adjusted by sight. A 4021 Pilot Tip with air-gas mixture on stoichiometric ratio produces a sharp, forceful fame with a well defined light blue inner cone and a deeper blue outer flame envelope. This flame produces a moderate amount of noise, which decreases when adjusted toward the rich limit.

A long, bushy, yellow/orange tipped flame envelope or a green colored fame denotes rich ratio. When a pilot is set too rich, the flame will start to move away from the tip.

A short, pale blue or violet flame indicates a lean ratio. When a pilot is set too lean, it may light under hot conditions but not reliably when cold.

Rich or lean air/fuel ratios may cause pilot to have insufficient flame length or drive to satisfy a flame detector and/or to ignite the main fuel

PILOT ADJUSTMENT

On most combustion system air and fuel pressures are 2 psi or less. Often the pressures are a small fraction of 1 psi. Pressure gauges made for low pressures are sensitive to rough handling. When servicing combustion equipment we recommend using a water or digital manometer for pressure measurement.

Flames often are not easily visible when sealed-in nozzles are used. Consider using a 8666 Testip to facilitate setting desired air /fuel mixture.

1. Before lighting any pilot, make sure the furnace has been adequately purged. This usually requires operating the main air blower long enough to make at least 4 volume changes before ignition (NFPA 86). Consult local codes for purge requirements.
2. Adjust the pilot air valve for the required pilot air pressure, generally 6 to 8 osi (10.5-14"w.c.) at the 1/8" air pressure tap in the pilot mixer air connection (or 3-5"w.c. at the 1/8" mixture pressure tap).
3. Starting from a fully closed position, open the pilot mixer gas adjusting screw about 4 turns (counterclockwise).

WARNING: Situations dangerous to personnel and property may exist with the operation and maintenance of any combustion equipment. The presence of fuels, oxidants, hot and cold combustion products, hot surfaces, electrical power in control and ignition circuits, etc., are inherent with any combustion application. Components in combustion systems may exceed 160°F (71°C) surface temperatures and present hot surface contact hazard. Fives North American Combustion, Inc. suggests the use of combustion systems that are in compliance with all Safety Codes, Standards, Regulations and Directives; and care in operation.

4. Energize both the ignition spark transformer and the pilot gas solenoid valve. If the pilot does not light, turn the gas adjusting screw in or out as required, until ignition occurs.

5. Fine-tune the pilot for best flame stability as follows: First, turn the gas adjusting screw clockwise until the pilot flame goes out. This is the "lean limit."

Next, counting the number of turns from the lean limit, turn the gas adjusting screw counterclockwise, lighting the pilot, and continuing until the rich limit is reached, ragged flame appearance and loss of the sharp inner cone.

Then, having counted the number of turns from lean to rich limit (generally 1 to 2 times), set the gas adjusting screw at mid-point between the limits. This will result in a condition near correct air/ fuel ratio.

6. Slowly turn the pilot air pressure down to 1.0 osi. If the flame appears to go off ratio, remove the pilot regulator adjusting cap and adjust the pilot gas regulator spring until the flame looks correct. Turning the regulator spring adjusting screw clockwise increases the gas flow; counterclockwise decreases gas flow. Replace the cap. Turn the pilot air pressure back up to its original setting.

7. With 6 to 8 osi (10.5-14"w.c.) pilot air pressure, the mixture pressure at the 1/8" pressure tap on the mixer discharge should be 3 to 5"w.c. when the flame is burning (mixture pressures are valid only if measured when burning).

KEEP RECORDS

ADDITIONAL PILOT INFORMATION

- Sheet 4000-2 Industrial Burner Flame Detection
- For pilot trouble shooting see the "North American Combustion Practical Pointers" book. (for a digital copy visit www.fivesgroup.com or ask your Fives North American sales representative.

CONTACT

fna.sales@fivesgroup.com

T +1 800 626 3477 - F +1 216 373 4237

Fives North American Combustion, Inc.
4455 East 71st Street - Cleveland, OH 44105 - USA
www.fivesgroup.com



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