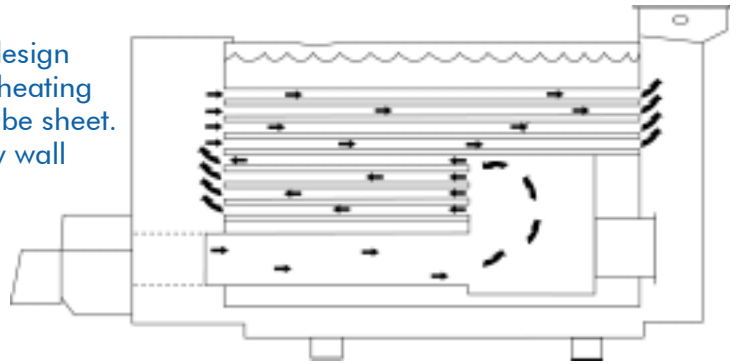


## WETBACK DESIGN vs HARD REFRACTORY DRYBACK DESIGN

### WHY IS A WETBACK DESIGN BETTER?

As indicated in the drawing, a three-pass wetback design has a rear water wall, which separates the primary heating surface of the combustion chamber from the rear tube sheet. The water jacket eliminates the need for a refractory wall and rear door swing space behind the boiler, as well as costly refractory maintenance.

The rear water wall eliminates the need for gasketing, which is vulnerable to the temperature generated in the rear of the turnaround area. The fact of the matter is—a wetback design boiler not only overcomes these expensive deficiencies, but it has great overall efficiency and virtually maintenance-free construction.



A Burnham Commercial boiler will cost you less over the lifetime of the boiler, because it is better by design.

### SOME POINTS TO REMEMBER:

#### Wetback Advantages

- Wetback boilers have separate tube sheets between all major temperature changes.
- The rear access door is constructed of lightweight space age vacuum formed ceramic fiber.
- The rear doors require no cool-down period and can be opened immediately.
- No space consuming area required to open the rear doors.
- Efficiency is maintainable because hot gases cannot short circuit in a wetback design.

#### Dryback Disadvantages

- Flue gas temperature differential of 1300F-1600F between the second and third passes creates damaging stresses on a single tube sheet. The cost of rear door refractory replacement (approximately every three years) will drastically increase operating costs, as well as yearly rear door gasketing.
- Opening and resealing the rear door is time consuming and requires a 24-hour cool down period prior to opening.
- The heavy refractory may sag on the davit and must be rigged back into place. Heavy jacks or expensive rigging may be required just to open and close the rear doors.
- Exposing the refractory to hot flue gases can cause erosion and destroy the baffle; resulting in "short circuiting" of the flue gas and lower efficiency.
- Rear refractory walls radiate heat with exterior radiation losses. These losses result in lowered efficiency when compared to a wetback design.

### BOILER COSTS—ARE THEY EQUAL?

The true cost of a boiler is a combination of purchase price, maintenance costs over the years, and operational efficiency of the boiler. The following provides practical and factual information to further explain Burnham wetback boilers:

- Fuel cost savings
- Boiler efficiency comparisons
- Dryback refractory replacement
- Overall operating efficiency

#### WHAT IS FUEL-TO-STEAM EFFICIENCY AND IS IT IMPORTANT?

Fuel-to-steam efficiency is very important because it is the only true measure of overall packaged boiler operational efficiency. True fuel-to-steam efficiency takes into account radiation and convection heat losses, which less reputable manufacturers may ignore. We suggest purchasing your boiler from a manufacturer who guarantees fuel-to-steam efficiency in the performance of your entire packaged boiler. Be wary of misleading efficiency terms, such as "thermal efficiency" or "combustion efficiency." Contact your local Burnham Commercial sales representative for further definition.

#### MAINTAINABLE EFFICIENCY VS. ATTAINABLE EFFICIENCY.

When looking at efficiency as criteria for purchasing a boiler, especially fuel-to-steam efficiency, the manufacturer's design efficiency sets theoretical fuel costs while operation efficiency determines actual fuel costs. There is a difference between attainable efficiency and maintainable efficiency. Correct burner adjustments are the key to maintainable efficiency. **It is a compromise between the optimum and the practical.** Good burner tuning is achievable only with a good burner design and a good burner/boiler package.

#### WILL A DRYBACK BOILER COST MORE TO OWN?

The answer is simple...Yes! The high cost of maintenance is the biggest consideration in overall efficiency in a dryback design. Consider this example: an average 300 HP boiler operating under normal conditions with a conservative lifespan of 25 years. Our surveys have shown that during this boiler's lifetime the rear door refractory would be replaced about 8 times (roughly every three years). Also, assuming the boiler is opened only once a year for inspection, regasketing of the rear door would occur 25 times.

How much cheaper is the hard refractory backed boiler?

So, somebody is offering a hard refractory backed boiler design for less money than a wetback design! While it may make your initial capital investment costs look great, what does it do to your pocketbook in the long run?

Let's take a look:

Average cost for replacing rear door hard refractory: \$6,000

Average cost of regasketing the rear door: \$500

Apply these costs to the average lifespan of the boiler:

$\$6,000 \times 8 = \$48,000$

$\$500 \times 25 = \$12,500$

Compare the costs of replacing the rear door gasket of your wetback design:

$\$30 \times 25 = \$750$

The difference between the hard refractory dry back maintenance and the wetback maintenance is  
 $\$60,500 - \$750 = \$59,750$ .

**Now comes the shocking part of the study.  
For the same amount of money spent in dryback maintenance,  
YOU COULD HAVE PURCHASED A BRAND NEW WETBACK BOILER!**