PROCESS HEATERS BROACH TECHNICAL NEWS
FROM THE G. C. BROACH COMPANY

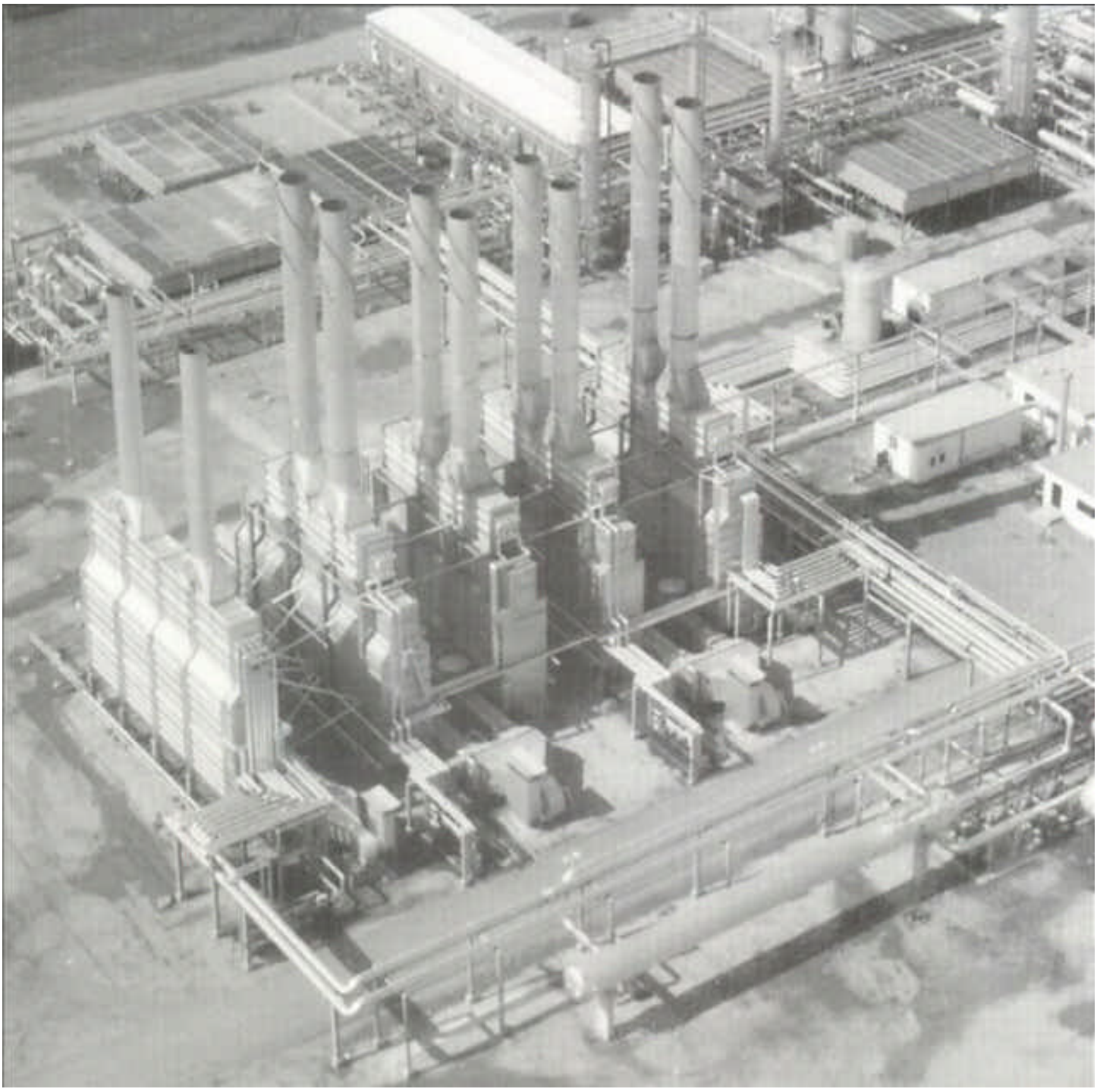
PAINLESS EFFICIENCY

ACHIEVE MAXIMUM EFFICIENCY AT MINIMUM COST & COMPLEXITY WITH THE ADJUNCT LOOP

The Adjunct Loop combustion air preheat system is the only preheat system that the furnace doesn't know is there. The operators hardly know it's there. The plant engineer forgets that it's there because there's not much to it, and it doesn't upset his plant operations. The only people who really know it's there are the refinery manager and the president, and the only reason that they know it's there is that it didn't cost very much, it doesn't cost much to run, and it saves them a lot of money.

PROCESS HEATERS

BROACH



FIVE 100M^2 BTU/HR HEATERS, ALL OPERATING AT 92.5% EFFICIENCY WITH BROACH ADJUNCT LOOP® COMBUSTION AIR PREHEAT SYSTEMS BY THE G. C. BROACH COMPANY

THE ADJUNCT LOOP

The Adjunct Loop is an oil system that is filled with the fluid being heated in the main heater coil. This fluid is circulated within the Adjunct Loop at a rate and temperature completely independent of the main process flow.

In the Adjunct Loop system, the oil is circulated through a convection coil in the top of the heater to absorb heat that would normally be wasted into the atmosphere. After absorbing this heat, the oil is circulated through an exchanger in the combustion air stream to heat the combustion air, thereby putting the otherwise wasted heat back into the furnace.

If a loop pump drops out, an automatic bypass valve opens automatically, putting the system in the bypass mode, where the Adjunct Loop convection coil becomes a part of the process coil, without operator intervention. Part of the flow to the main heater coil inlet is circulated through the Adjunct Loop convection coil and then to the main heater coil outlet. The only effect on the furnace operation is a temporary reduction in furnace efficiency until such time as the spare pump is started. The only action required by the operator is to push the start button for the spare pump. In the bypass mode, neither the furnace nor the plant knows that anything has happened. As soon as the spare pump reaches speed, the bypass valve is automatically closed, and the furnace goes back on preheat, still not knowing anything has happened except that its efficiency is back up where it should be.

If the forced draft fan drops out, the system automatically goes into the bypass mode just described, an atmospheric air entry door automatically opens, and the furnace goes over to natural draft operation, still without operator intervention and without the heater or the plant knowing that anything has happened. When the fan is fixed, the operator pushes the start button and the whole system automatically goes back on preheat.

The systems operate in flue gas temperatures up to 650^{o}F and are designed to achieve the maximum overall thermal efficiency consistent with the dew-point characteristics of the flue gas, normally in the range of 92% when sweet gas is to be fired, and 90% when the unit will be fired with fuel oil.

The Adjunct Loop system **totally and completely** eliminates any possibility of cold-end corrosion. No surface is present in the system where cold combustion air is on one side, and hot flue gas is on the other side.

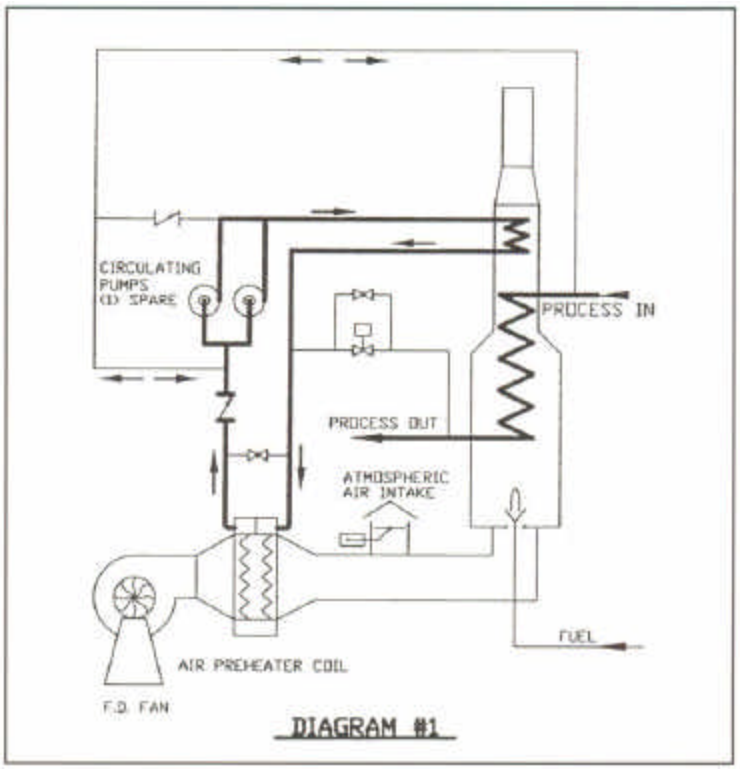
In the Adjunct Loop system, the heat is moved around by pumping oil through small pipes instead of moving a lot of hot flue gas around with big fans through big ductwork. All heat exchange is accomplished in conventional tube bundles instead of in immense sophisticated gas-to-gas exchangers. These factors, with others, combine to reduce the operating horsepower to about 1/4 of that required for other preheat systems. Very little plot space is required, and, with the pumps and all of the valves and controls shop assembled on one skid, there are only a few parts and pieces to install in the field, which is especially important on retro-fit projects.

In those applications where environmental regulations may require a very tall stack (150’ or more above grade), the Adjunct Loop system can very easily be designed to operate without a forced draft fan, further reducing horsepower requirements.

The system is filled with the product being heated in the furnace proper, so there is no filling cost - only a very small increase in product inventory; thus avoiding the purchase, storage, and inventory of special heating fluids.

Diagram #1 shows the flow path for the Adjunct Loop during normal operation indicated by the heavy lines. The light line at the top of the diagram is termed the communicator line, connecting the loop to the process coil inlet for filling, expansion and contraction of the fluid in the loop, and for feed to the Adjunct Loop convection section in the bypass mode. The light line connecting the loop with the process coil outlet is open only in the bypass mode, and completes the bypass circuit.

A globe valve is located between the transfer lines to and from the combustion air preheat coil to provide the means to bypass oil around the combustion air preheat coil, and thus raise the stack temperature if the stack temperature falls below a desired minimum level. This valve can be easily automated with a simple temperature control loop to maintain the stack temperature at a set level.



A small globe valve, designated the "Trickle Valve", is located in a loop around the automatic valve that initiates the bypass mode. The trickle valve can be opened to allow a small volume of oil to leave the Adjunct Loop, being replaced by an equivalent volume of oil entering the loop thru the communicator line, to constantly replenish the oil being circulated in the Adjunct Loop.

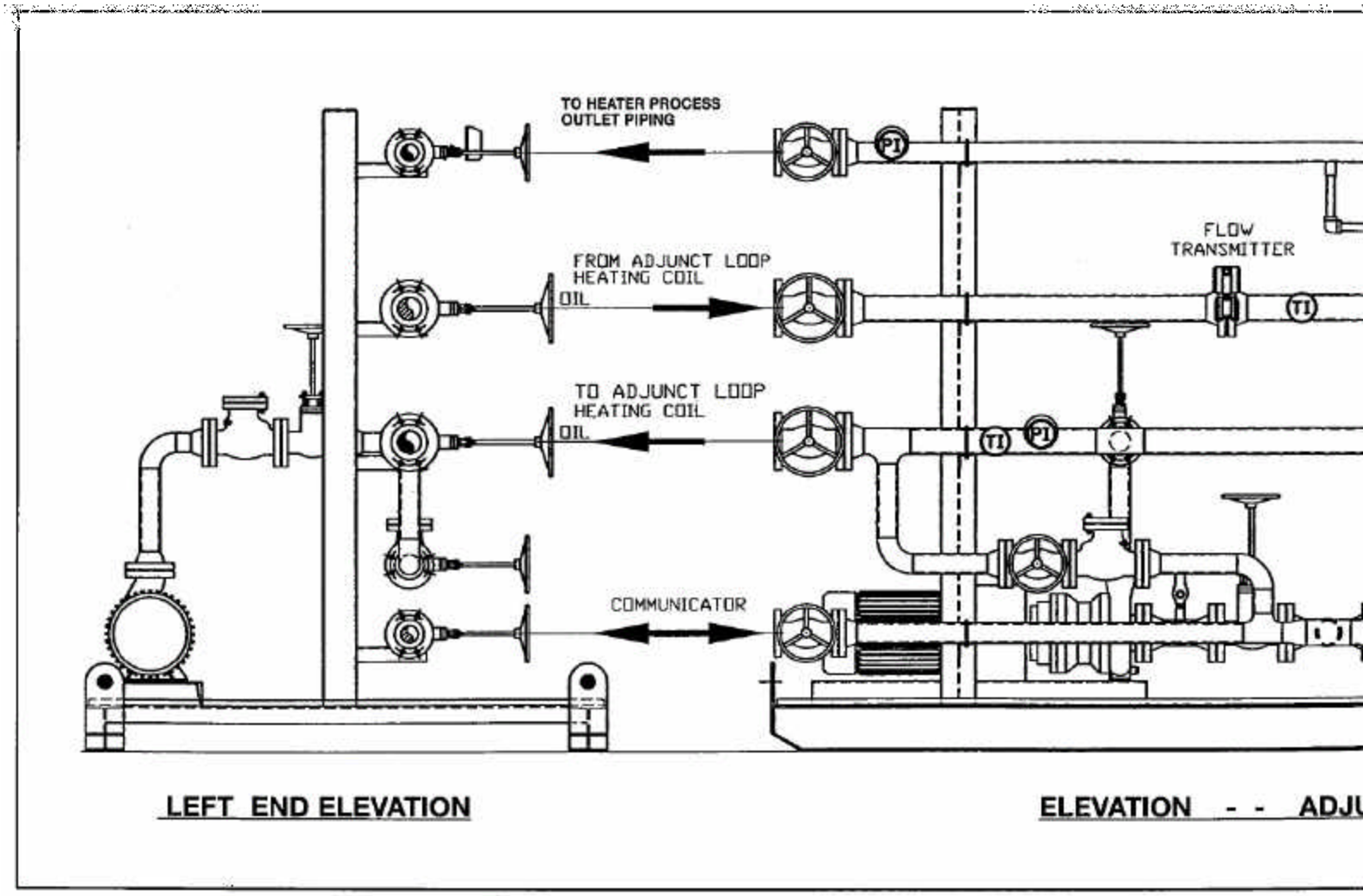


Diagram #2 shows the bypass mode in heavy lines. Here you can see how the Adjunct Loop convection coil becomes just another part of the main process coil when the system is running in the bypass condition. The loop bypass discharge is fed into the heater outlet ahead of the temperature controller so that the process downstream of the heater is unaffected by the switch to bypass.

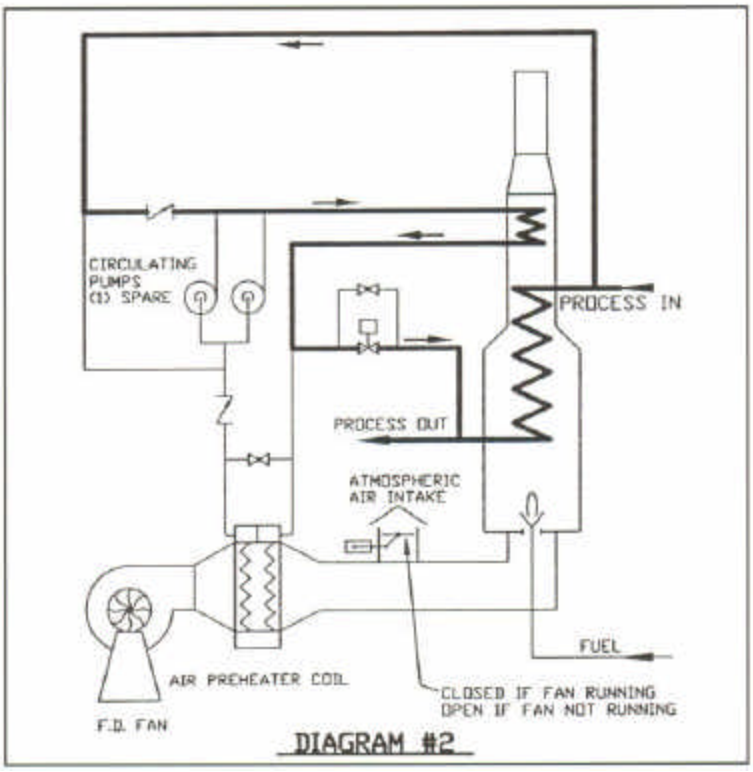
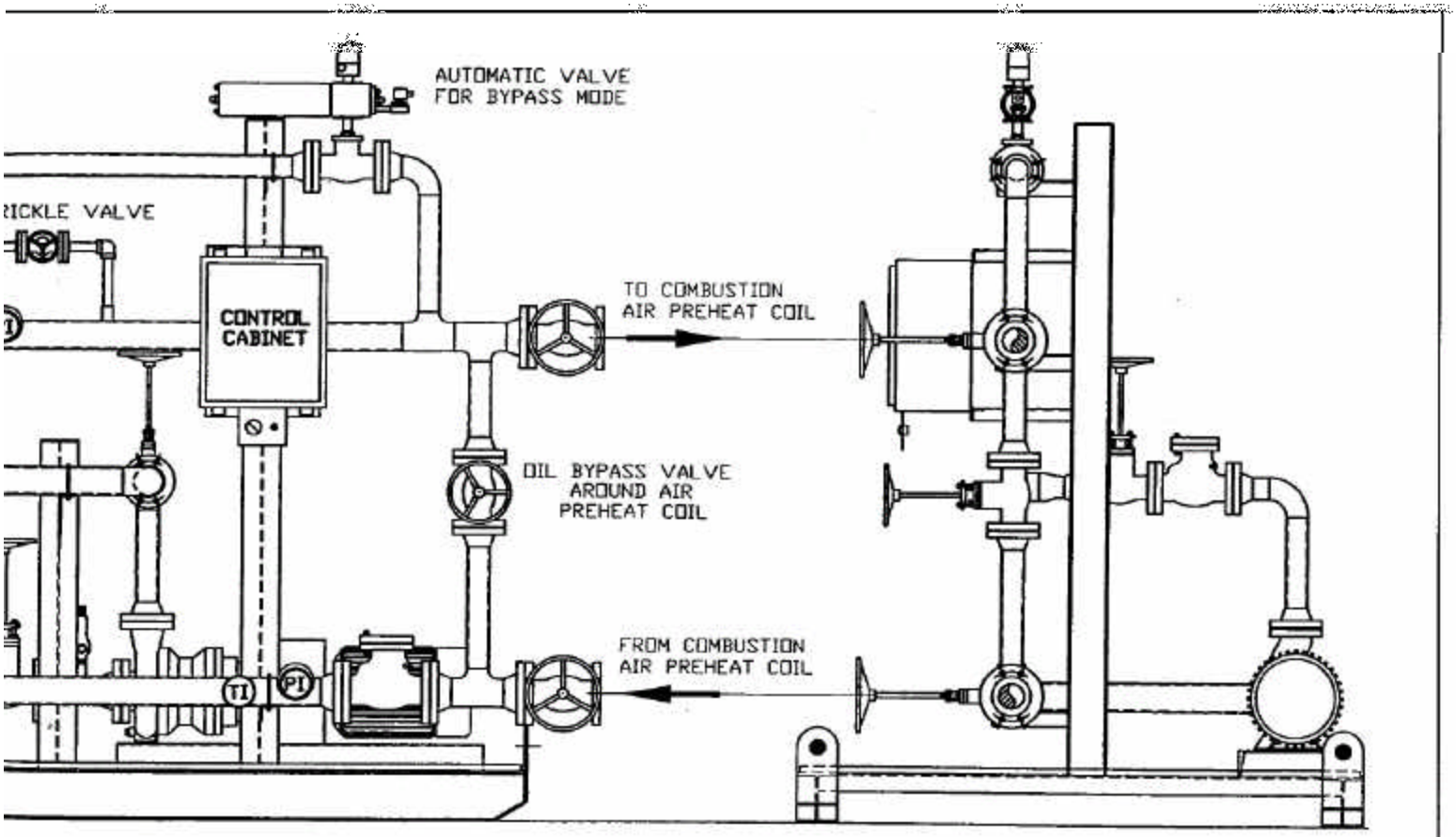


DIAGRAM #2

As a truly significant advancement in the state of furnace design, every aspect of the Adjunct Loop is covered by broad patents in the U.S.A. and nine other countries. Its outstanding characteristic is unique simplicity; its outstanding benefits are low installation, operation, and maintenance costs, and utmost compactness. Each Adjunct Loop system is furnished with built-in instrumentation and controls for fully automatic operation, reducing operator attention to minimal routine surveillance.

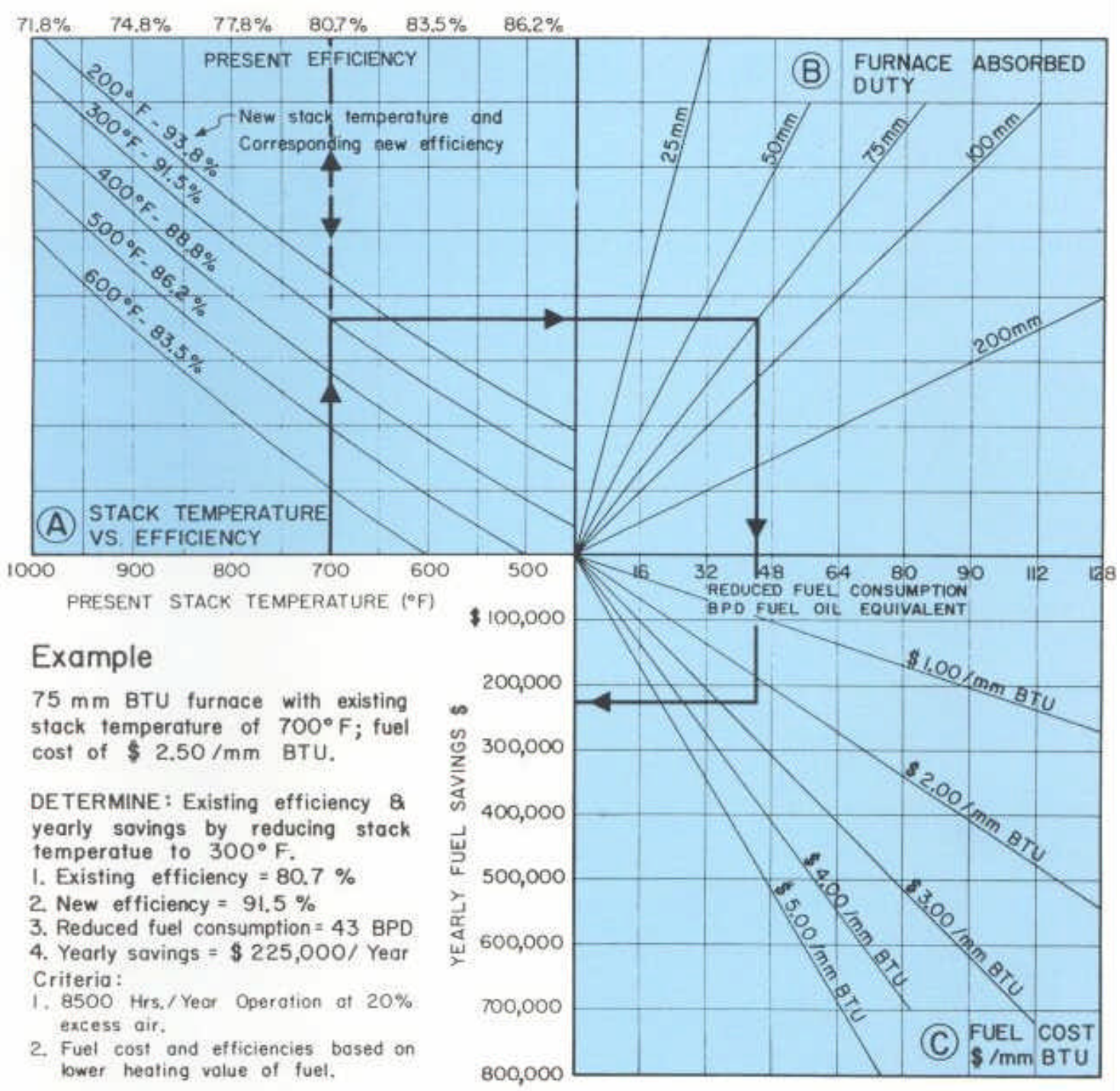


CT LOOP PUMP SKID

RIGHT END ELEVATION

In approaching furnace efficiency, we consider all parameters to achieve maximum efficiency at the lowest installed cost. There are many avenues to the achievement of higher furnace efficiency, and we can determine which one is the best for your furnace.

Whether you are contemplating new heater equipment, or retro-fitting existing heater units to maximize efficiency, please contact us so that you may have our proposal to illustrate and compare the impressive cost/savings ratios that can be achieved with systems designed by Broach.



FUEL SAVINGS CHART

Use the above chart to determine the yearly savings that can be achieved by increasing the efficiency of your existing furnaces.

Those savings represent energy conserved, total stack emissions reduced and barrels of oil that convert directly from operating expense to revenue.

Allow us the opportunity to develop, design and price the efficiency improvement systems best suited to your existing equipment and budget.

ADJUNCT LOOP

PROCESS HEATERS
BROACH

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