

## **Boiler Economizer Specification – Circular Design**

This specification defines the minimum requirements that must be met for the design and fabrication of vertical gas flow cylindrical economizers. No deviation from this specification is permissible without documented approval.

**I. Description of Operation**

The purpose of the equipment is to recover waste heat using the established principle of a gas to liquid heat exchanger. The economizer should be a finned tube coil assembly installed either inside or parallel to the boiler exhaust stack or duct. Feedwater under pressure will circulate in the tubes of the coil and heat will be transferred from the flue gases to the water.

**II. The Heat Exchanger**

- A. Furnish ( ) economizer(s), as described below, to recover waste heat from the boiler exhaust stack.
- B. The economizer shall be counterflow type arranged to allow the boiler exhaust gas to travel vertically upward, while the feedwater travels vertically downward (or vice versa).

**PERFORMANCE**

- A. Economizer shall be designed to operate at 100% load without bypassing any flue gas or feedwater.
- B. Fouling factors to be used for fuels:
  - 1. Natural Gas .001
  - 2. #2 Oil .002
  - 3. #6 Oil .005
- C. Required performance data:

	Tube Side	Shell Side
Total Fluid Entering		
Temperature In		
Temperature Out		
Pressure Drop		
Boiler design pressure		--
Fuel Type	--	

*Fuels: Natural Gas, #2 and #6 Oils*

**ECONOMIZER - DESIGN & CONSTRUCTION**

The economizer shall be a cylindrical type, completely packaged unit, utilizing extended surface finned tubes, as designed and fabricated by E-Tech or approved equal.

- A. All pressure parts shall conform to the applicable provisions of the current ASME Power Boiler code. The economizer shall be properly name plated and code stamped. The design pressure shall meet or exceed the design pressure of the boiler.
- B. Tubes shall be 1.25" O.D. with a minimum wall thickness of .095". Tube to tube and tube to manifold connections should be done using a Gas Tungsten Arc Welding (GTAW) process.
- C. Headers shall be A106 material. Terminal connections, three inches and larger, shall be 300 lbs. RFWN minimum. Vent, drain, temperature and pressure connections minimum 3/4" shall be included. All such connections shall be threaded and plugged.
- D. All coils shall be completely drainable by gravity while operating in a vertical position.
- E. Method of tube supports shall allow for free flow of hot gases around the welds and manifolds.
- F. The unit shall be non-steaming, suitably arranged for tube internal acid cleaning and tube external sootblowing with air or steam. Economizer outlet feedwater temperatures should be at least 30°F below the saturation temperature.
- G. Sootblowers shall be provided and installed where the economizer is designed for any fuel other than clean Natural Gas or similar fuel. Sootblowers shall be installed transverse to the tubes.
- H. A gas tight inner seal welded 12 Ga. steel shall be insulated and covered with 30 Ga. minimum thickness corrugated galvanized steel metal lagging.
- I. Spiral Fintube Economizers:
  - 1. The tube pitch shall be square to insure ease in cleaning.
  - 2. Minimum Clearance between fin tips - 3/8 inch.
  - 3. Fins shall be either welded or extruded. Tension wrapped, embedded, cast iron or brazed finned tubes are not acceptable.
  - 4. Fin material may be carbon steel for all fin tip temperatures 800°F and cooler. Above 800°F fin tip temperature, alloy materials must be used.
- J. All exterior surfaces, not galvanized, shall be painted with one coat of high temperature black or aluminum paint.
- K. Insulation shall be medium temperature mineral wool.
- L. Insulation thickness shall be not less than 2". Calculated insulation thickness shall be such to maintain a maximum surface temperature of 140°F with 80°F ambient air and a surface wind velocity of 5 feet per second.