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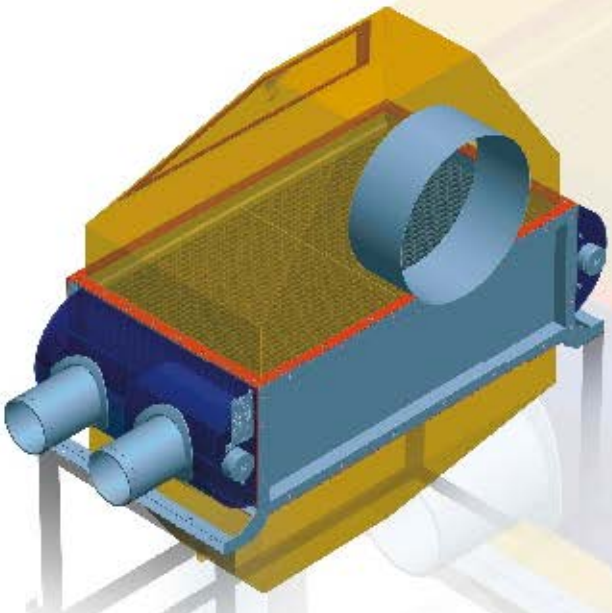
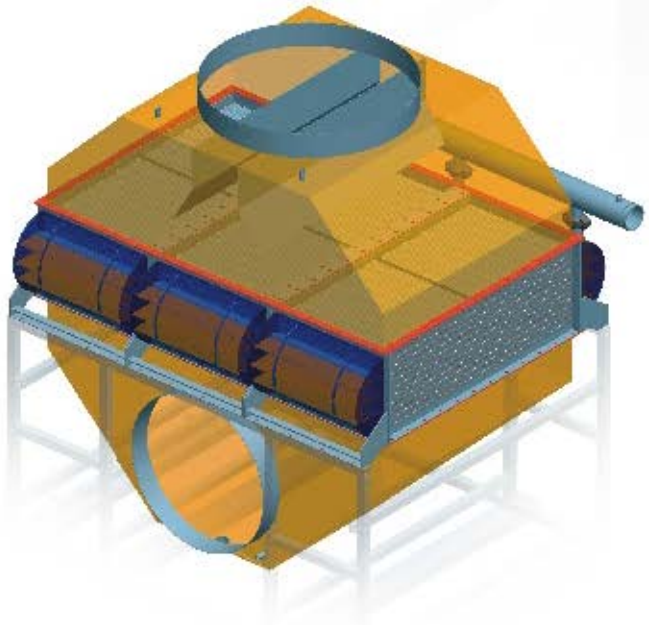
CONDENSING ECONOMIZERS – KEY TO A SUCCESSFUL HEAT RECOVERY

Energy costs are the highest in recent history. Implementation of efficiencies in thermal processes is a vital element in streamlining rising energy costs.

Installation of condensing economizers can help companies improve overall heat recovery and steam system efficiency by up to 20%.





In the boiler room E-LINE economizers transfer their waste heat to either the feed water or combustion air pre-heaters, essentially converting standard boilers into condensing boilers.

Covering a wide range of boiler sizes (from 250 kW to up to 6 000 kW), the E-LINE delivers real energy and cost savings for commercial and industrial installations.

E-LINE economizers from SECESPOL are an integral part of any efficiency improvement program. The total range includes 7 economizer models.

E-LINE features and benefits:

- increased system efficiency,
- real energy and cost savings,
- converts standard boilers into condensing boilers,
- increases existing boiler efficiency by up to 20%,
- feasible for boiler systems ranging from 250 kW to 6 000 kW,
- unique tube design for optimal thermal performance,
- easy installation, low maintenance.

Typical economizer applications include:

- district heating systems,
- greenhouses,
- food processing plants,
- pulp and paper mills,
- textile plants,
- dairy processing facilities,
- hospitals,
- hotels.

MONEY SAVINGS WITH E-LINE ECONOMIZERS !!!

Approximate energy savings achieved with E20.1 economizer model:

INPUT DATA	
HOT WATER INLET TEMPERATURE	30°C
FLUE GAS TEMPERATURE	220°C
BOILER INPUT	1 450 kW (145 m^3/h – natural gas flow)
BOILER OPERATING TIME	8 400 h/yr (full load operation)
ENERGY SAVING	15.7% (ref. chart 1 – see opposite)
PAYBACK SUMMARY	
ANNUAL NATURAL GAS SAVINGS	191 226 m^3
ANNUAL CO_2 REDUCTION	382 452 kg
ANNUAL COSTS SAVINGS	105 174 EUR*

*(natural gas avg price = 0.55 EUR/m^3)

E-LINE PERFORMANCE CHART

Entry data:
Nominal boiler input: 1 450 kW
Nominal boiler efficiency: 90%
Water inlet temperature: 30°C
Flue gas temperature: 220°C

STEP 1

Determine your boiler capacity on the horizontal axis labeled "kW" – for sample purposes we have chosen 1 450 kW boiler, ref point 1 .

STEP 2

Find points where the red line crosses with water inlet temperature indications (arched colored lines). Assuming water inlet temperature is 30°C, intersections points are marked 2 and 4 . Corresponding horizontal lines and points marked 3 and 5 indicate overall boiler efficiency to be 105.7% and 104.5% respectively.

Associated energy savings are as follows:
- 15.7% for E20.1 model (105.7% - 90% = 15.7%) and
- 14.5% for E16.1 model (104.5% - 90% = 14.5%).

STEP 3

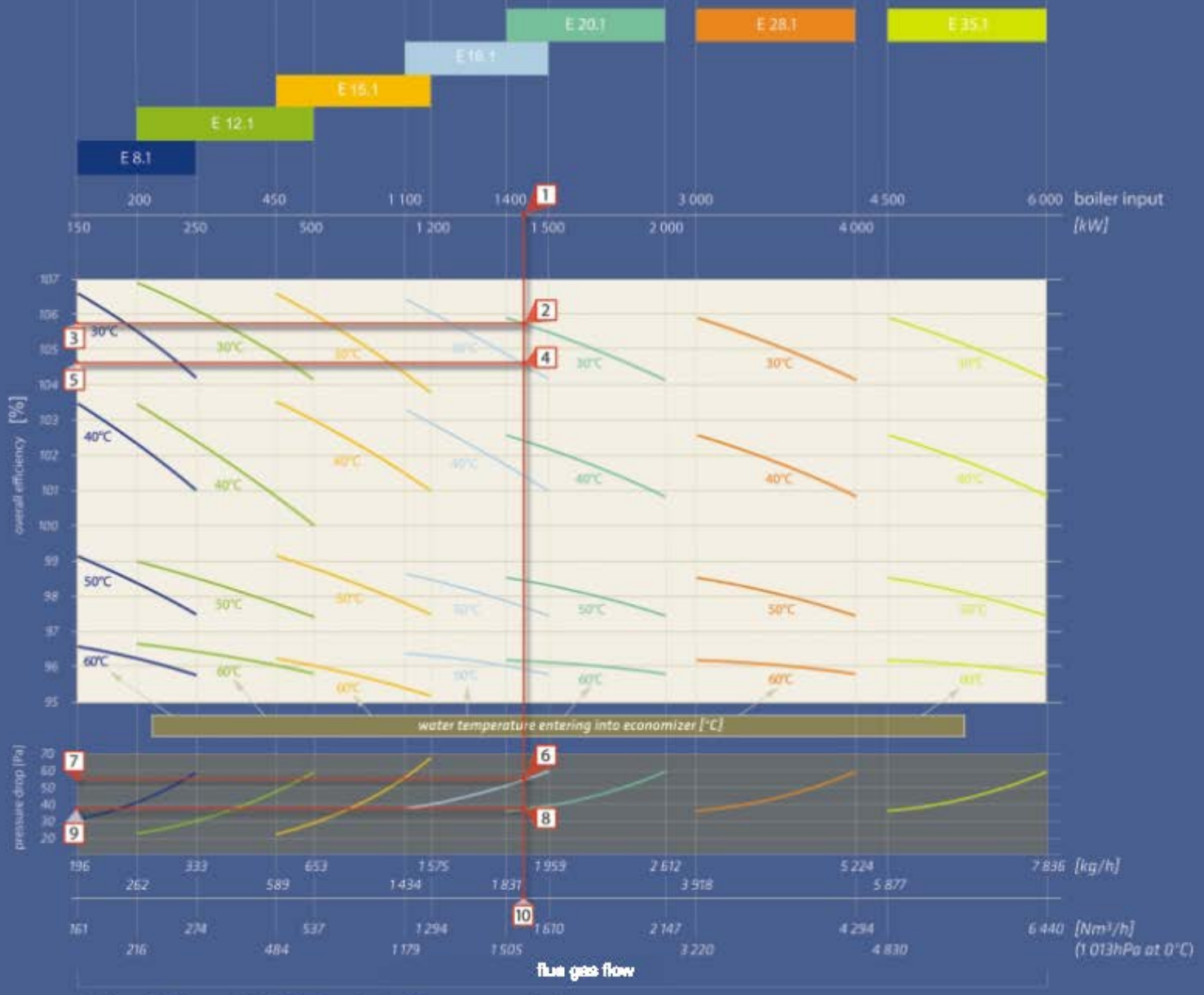
Intersection points 6 and 8 and corresponding horizontal lines pointing to 7 and 9 show pressure drop values for the given boiler capacity.

For E20.1 model – pressure drop of 38 Pa.

For E16.1 model – pressure drop of 55 Pa.

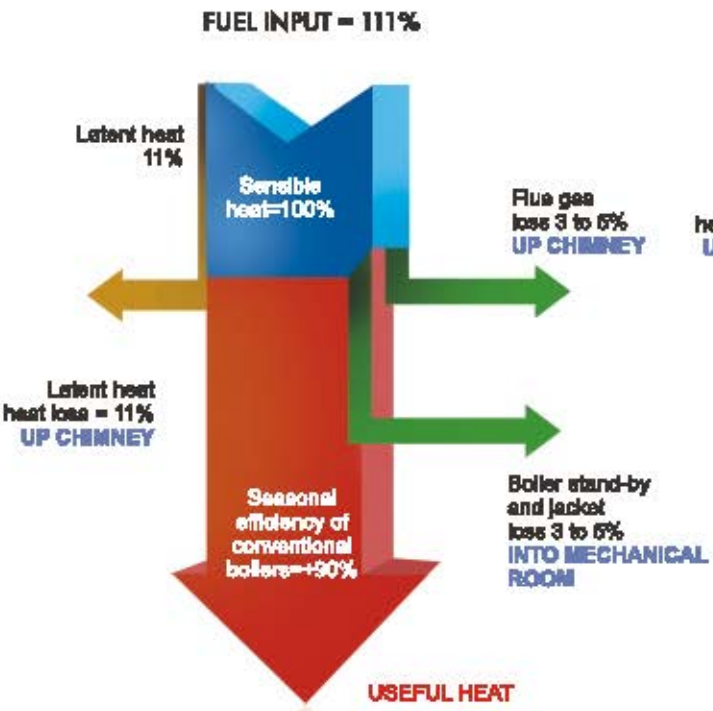
Conclusion:

The sample case above shows 2 economizer models E16.1 and E20.1 as possible solutions. The E20.1 model has a higher efficiency and lower pressure drop compared to E16.1, therefore is an overall better choice.

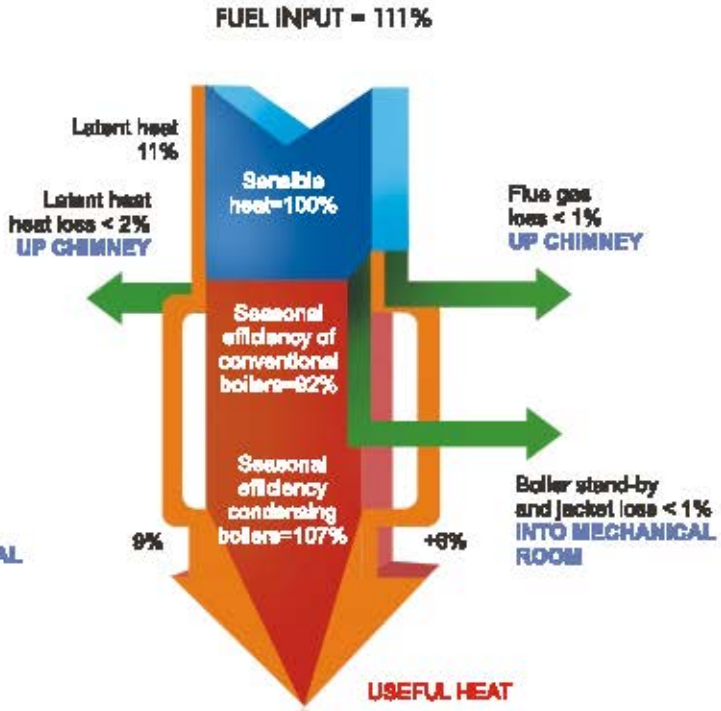


Boiler efficiency: 90% (before installing economizer)
Flue gas temp.: 220°C
Fuel: Methane CH_4 - λ

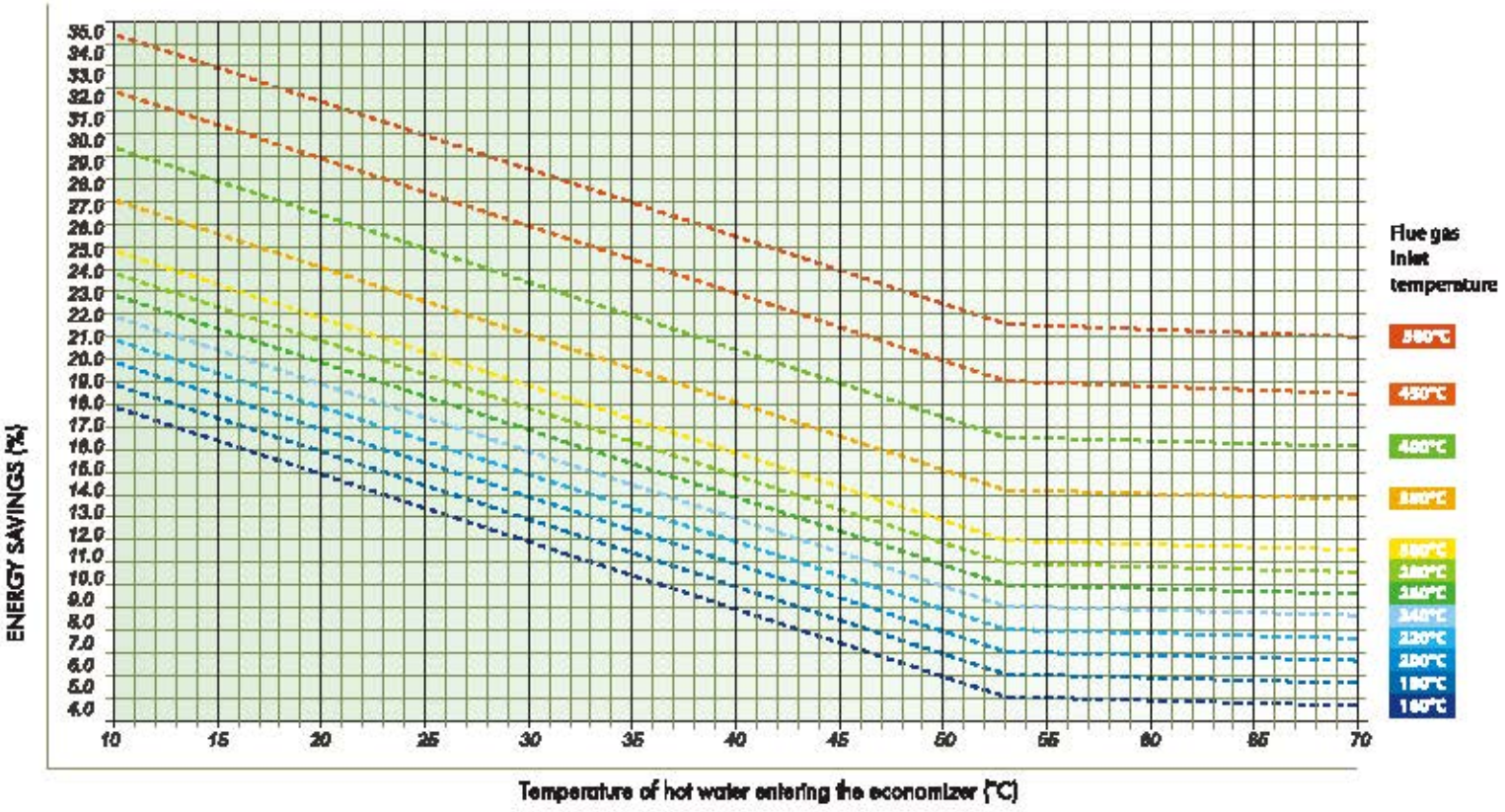
CONVENTIONAL BOILER HEAT FLOW



CONDENSING BOILER HEAT FLOW

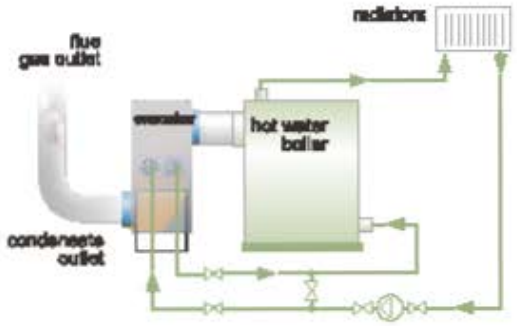


ENERGY RECOVERY FROM COOLING FLUE GAS

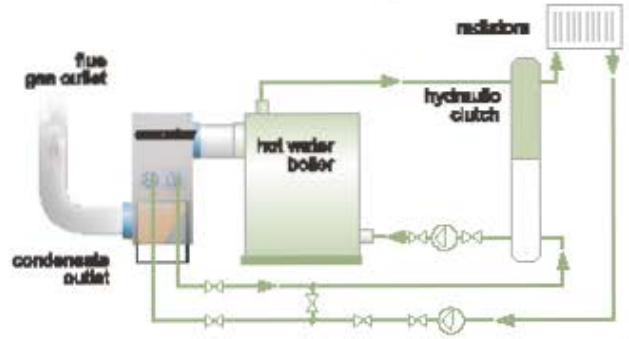


INSTALLATION DIAGRAMS – DIFFERENT ARRANGEMENTS

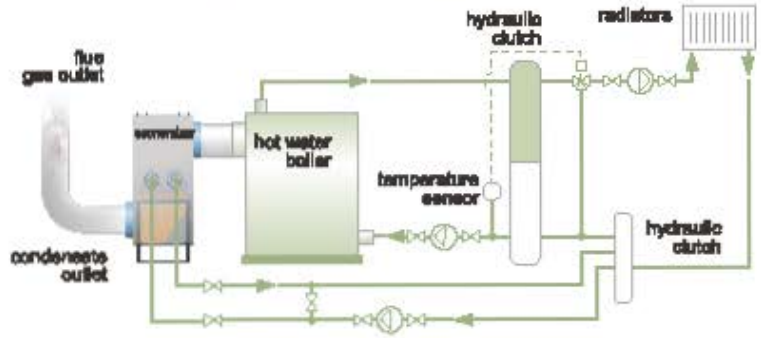
- **DIAGRAM 1**
  E-LINE economizer and boiler connected in series.



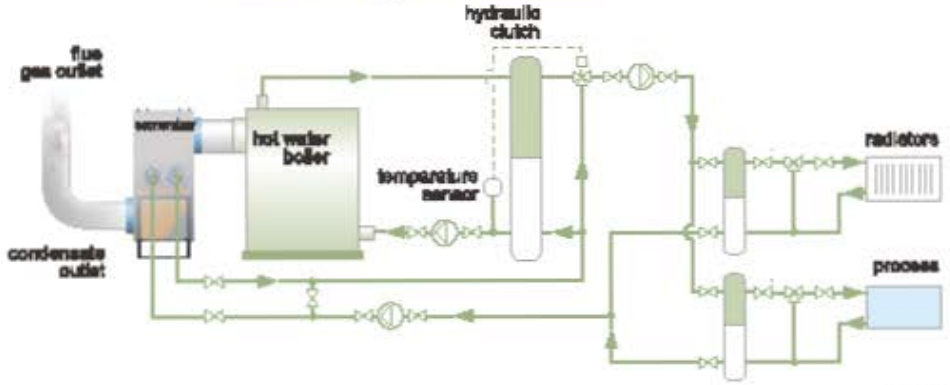
- **DIAGRAM 2**
  E-LINE economizer and boiler connected in series with additional hydraulic clutch.



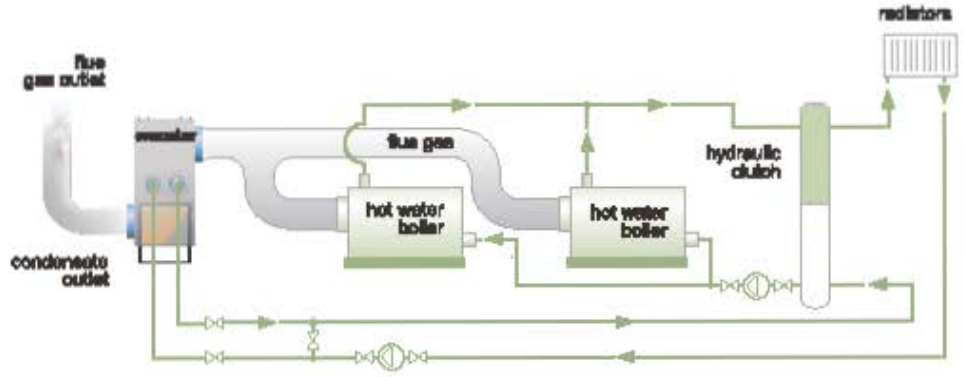
- **DIAGRAM 3**
  E-LINE economizer and boiler with two additional hydraulic clutches and three-way valve.



- **DIAGRAM 4**
  E-LINE economizer and boiler with three additional hydraulic clutches and three-way valve.

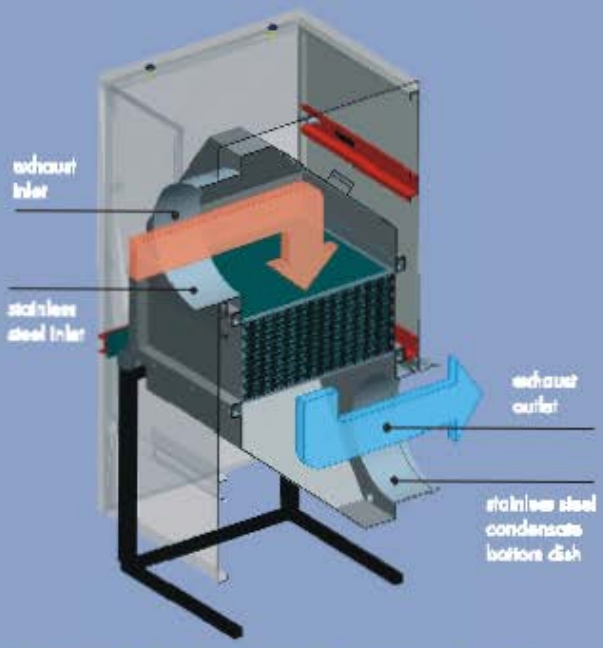


- **DIAGRAM 5**
  E-LINE economizer and two boilers with hydraulic clutch.



The economizer's simple technology and lack of moving parts gives it a very long and relatively maintenance-free life cycle. Simple paybacks for condensing economizers are often less than 2 years.

The unique design of the heat exchanger tubes, the so-called "tear-drop" shape, guarantees maximum heat transfer surface contact with the flue gas, while decreasing the creation of flow wakes. The tubes are strategically positioned in a matrix to optimize the thermodynamic process, by inducing gas turbulence and increasing the heat transfer rate, and minimizing overall gas pressure drops through the system.



The stainless steel durable construction is designed to withstand the corrosive effects of condensing flue gases, and is insulated to minimize heat losses.

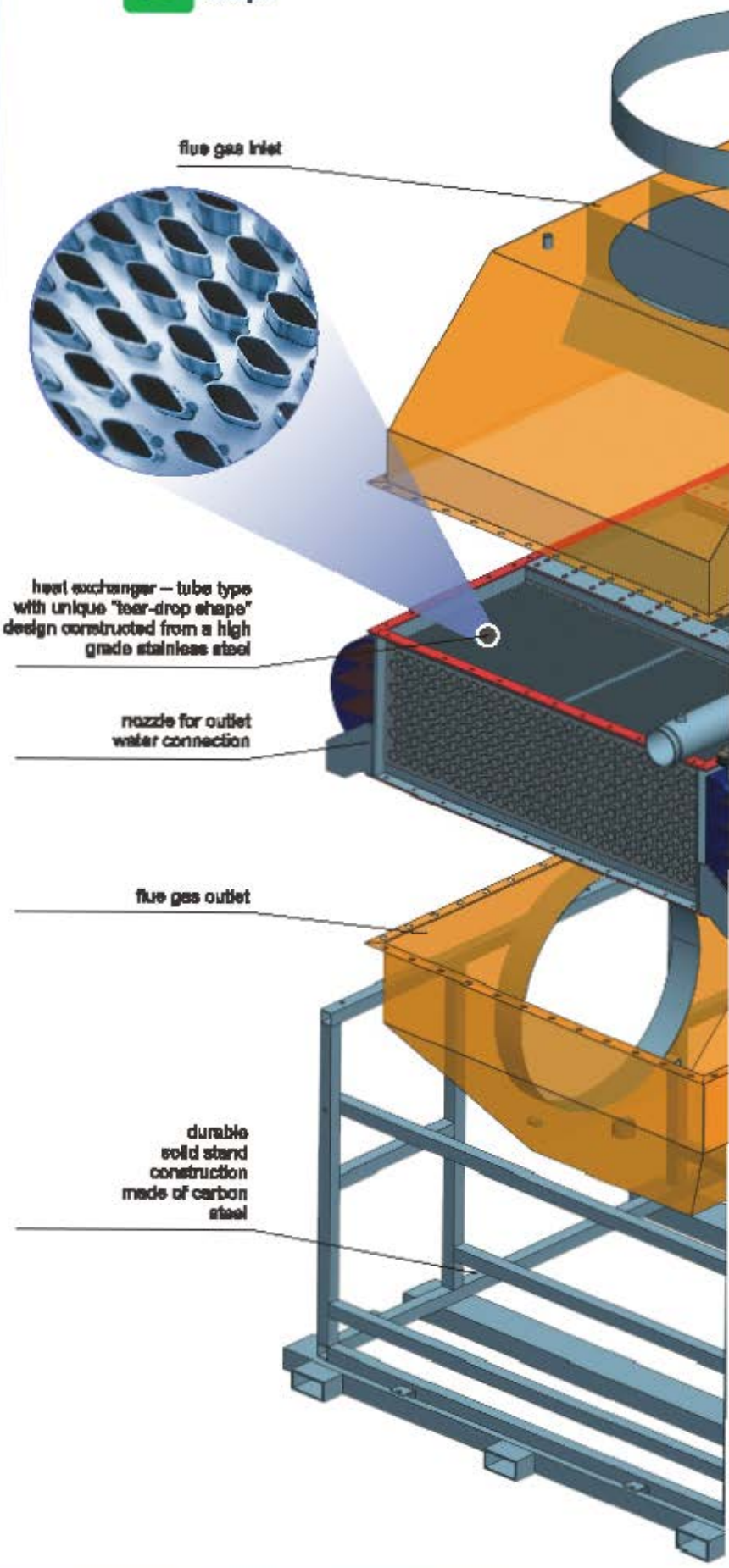
ECONOMIZER CONSTRUCTION MATERIAL:

- stainless steel 316L or 304L
  - for economizers working with gas-fired boilers
- stainless steel 904L
  - for economizers working with heavy-oil fired boilers (optional)

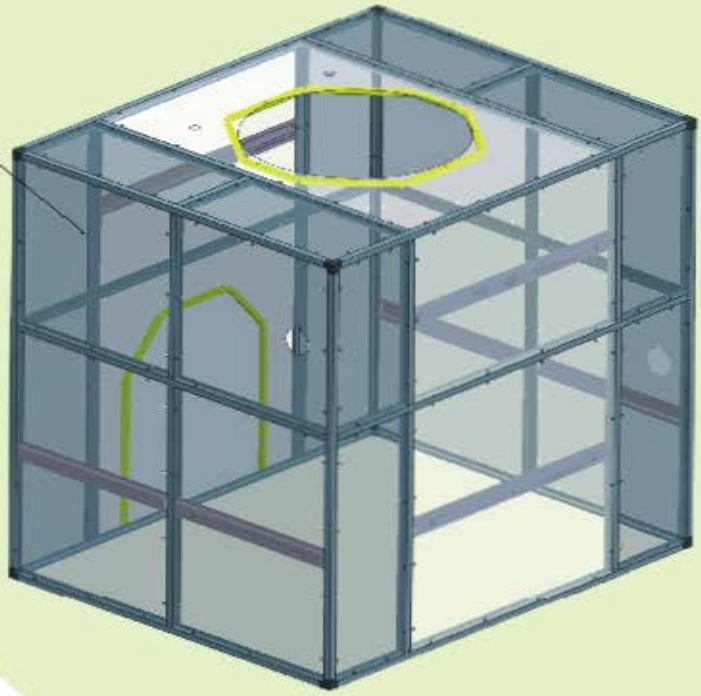
WORKING PRESSURE 11 BAR

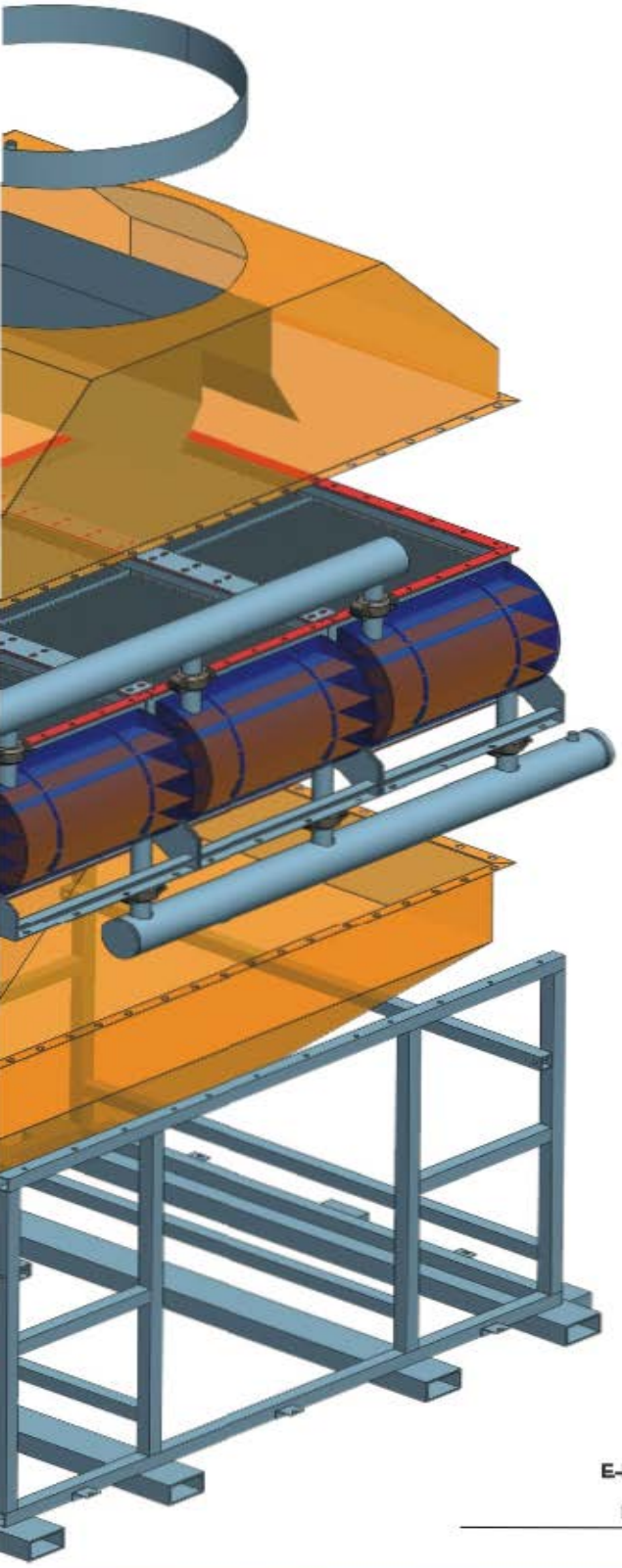
ECONOMIZER CONSTRUCTION

tear-drop shape

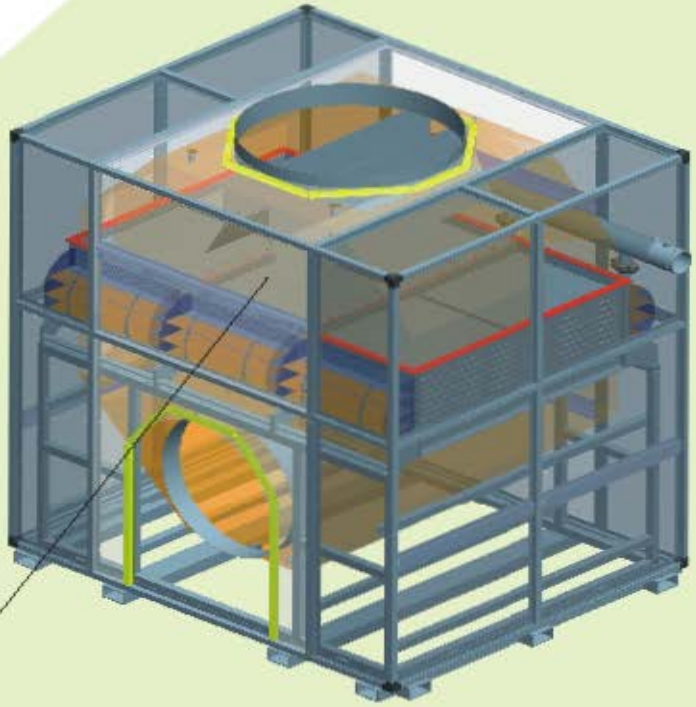


E-LINE casing – easily removable metal panels insulated with mineral wool allow for inside surface inspection and cleaning





nozzle for inlet water connection



E-LINE model E 35.1 in its casing

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