SEC Heat Exchangers

eLine

your environment

high efficiency
Condensing Economizers

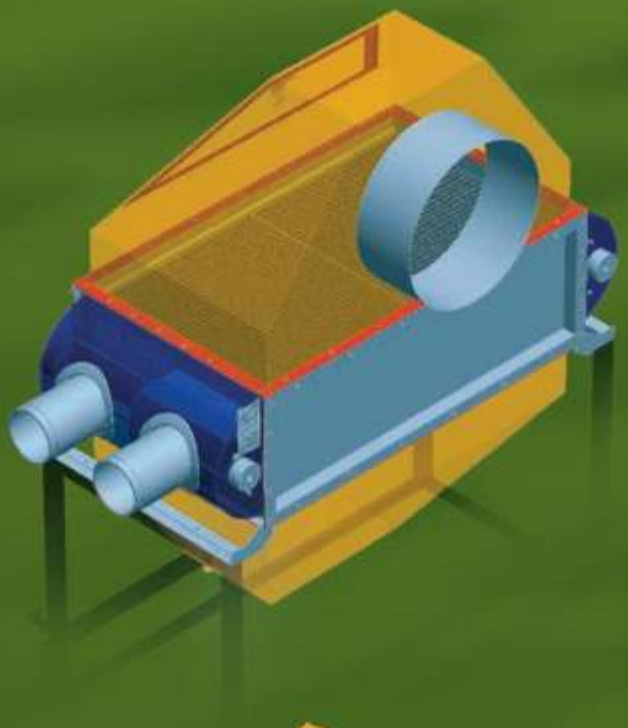
CONDENSING ECONOMIZERS – KEY TO A SUCCESSFUL HEAT RECOVERY PROJECT

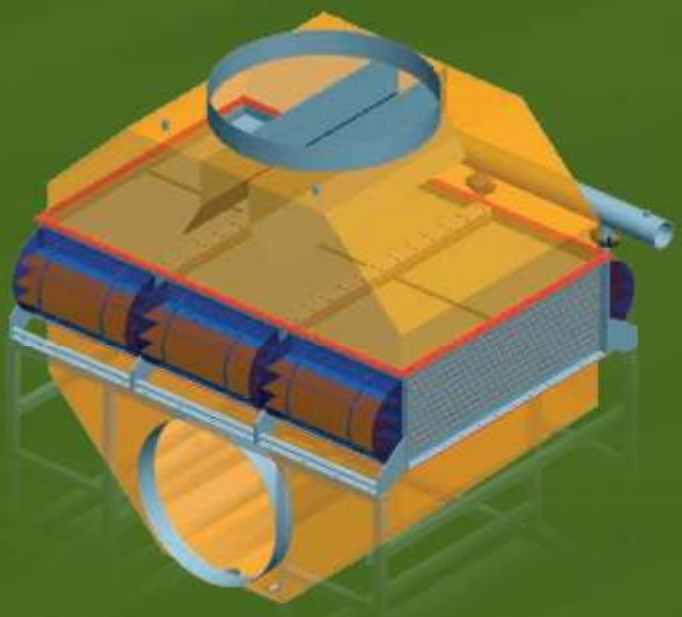
Energy costs are the highest in recent history. Implementation of efficiencies in thermal processes is a vital element in streamlining rising energy costs.

Installation of condensing economizers can help companies improve overall heat recovery and steam system efficiency by up to **20% (in standard applications).**

In the boiler room eLINE 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 500 MBTUH to up to 20 500 MBTUH), the eLINE delivers real energy and cost savings for commercial and industrial installations.





eLINE economizers from *SEC* are an integral part of any efficiency improvement program. The total range includes 7 economizer models.

eLINE 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 500 MBTUH to 20 500 MBTUH
» 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 eLINE ECONOMIZERS !!!

Approximate energy savings achieved with E20.1 economizer model:

INPUT DATA	
HOT WATER INLET TEMPERATURE	86°F
FLUE GAS TEMPERATURE	428°F
BOILER INPUT	4 952 MBTUH
	(85 SCFM /145 m3/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	**843 161 lb**
ANNUAL COST SAVINGS	**149 156 USD***

**(natural gas avg price = 0.78 USD /m^3)*

eLINE PERFORMANCE CHART

Entry data:
Nominal boiler input: 4 952 MBTUH
Nominal boiler efficiency: 80%
Water inlet temperature: 86°F
Flue gas temperature: 428°F

STEP 1
Determine your boiler capacity on the horizontal axis labeled "kW" – for sample purposes we have chosen 4 952 MBTUH 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 86°F, intersections points are marked 2 and 4 . Corresponding horizontal lines and points marked 3 and 5 indicate overall boiler efficiency to be 95.7% and 94.5% respectively.
Associated energy savings are as follows:
· 15.7% for E20.1 model (95.7% - 80% = 15.7%) and
· 14.5% for E16.1 model (94.5% - 80% = 14.5%)

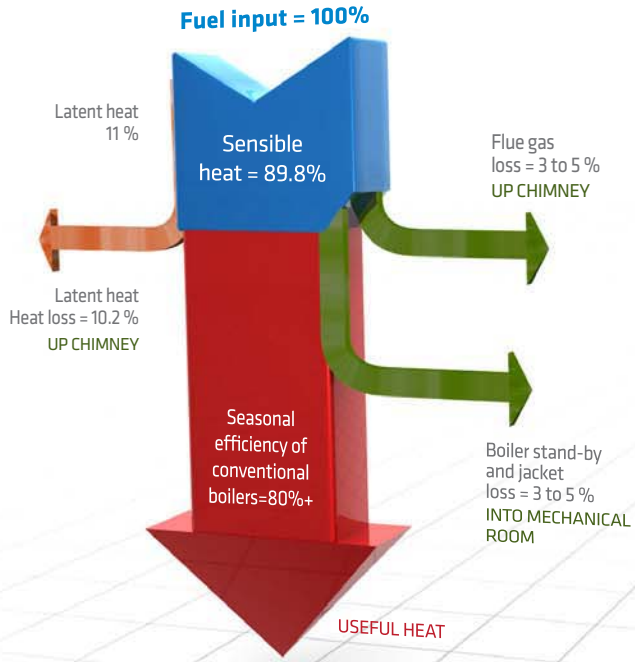
STEP 3
Intersection points 6 and 8 and corresponding horizontal lines pointing to 7 and 9 show pressure drop values for the given boiler capacity.
For E20.1 model – pressure drop of 0.15 in H_2O
For E16.1 model – pressure drop of 0.22 in H_2O

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.

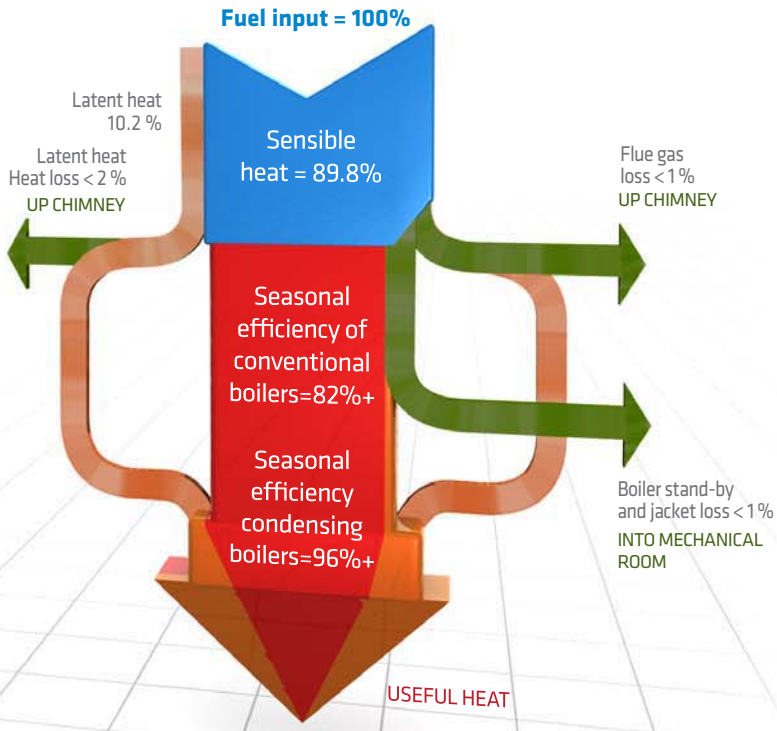
Boiler efficiency: 80% (before installing economizer)
Flue gas temp.: 428°F
Fuel: Methane CH_4 - λ

Chart 1

Conventional boiler heat flow



Condensing boiler heat flow



ENERGY RECOVERY FROM COOLING FLUE GAS

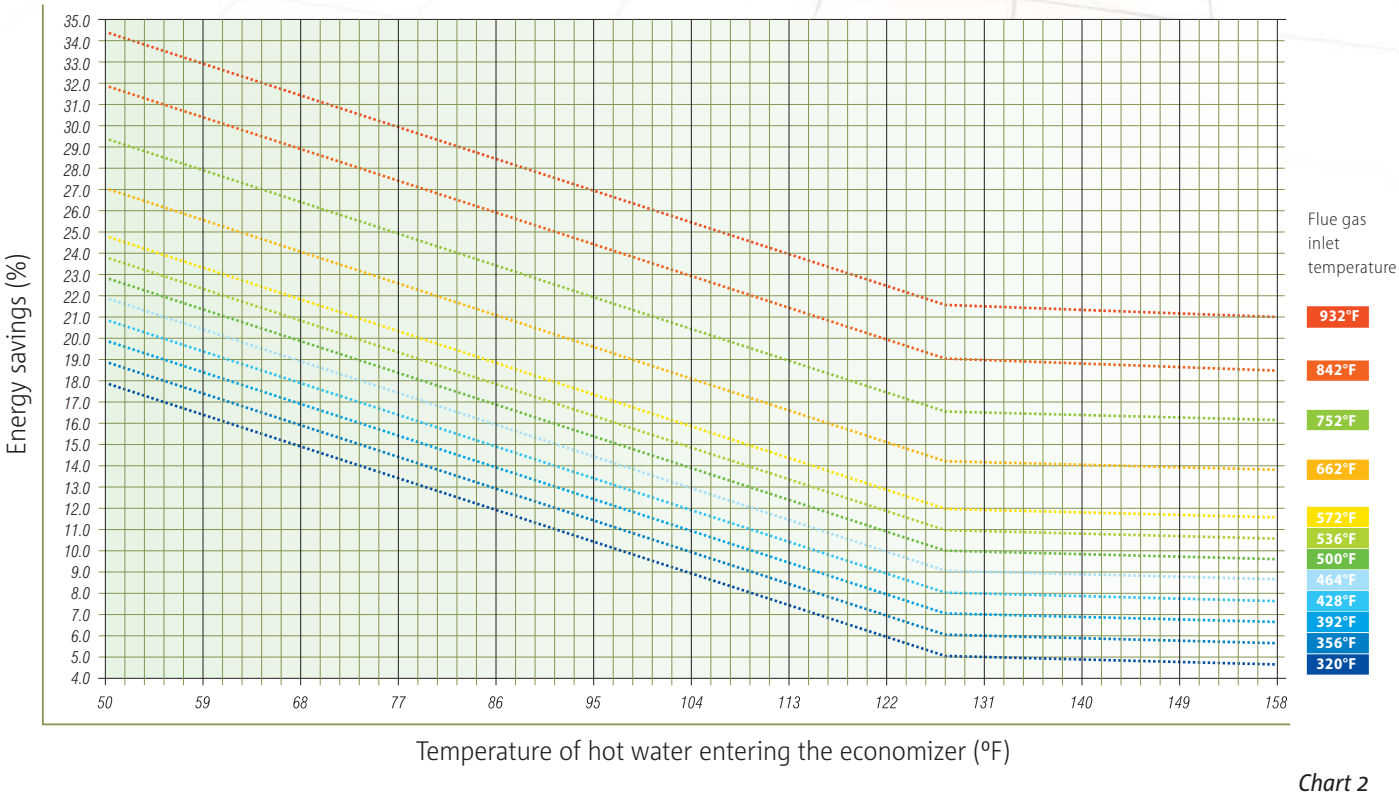
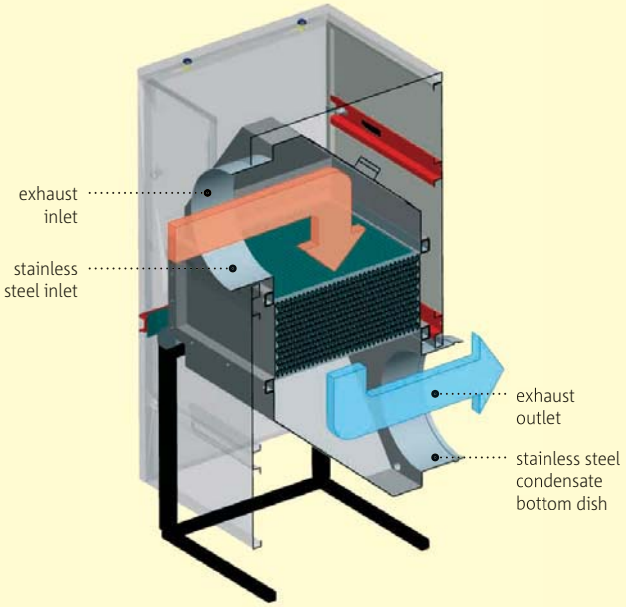


Chart 2

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.

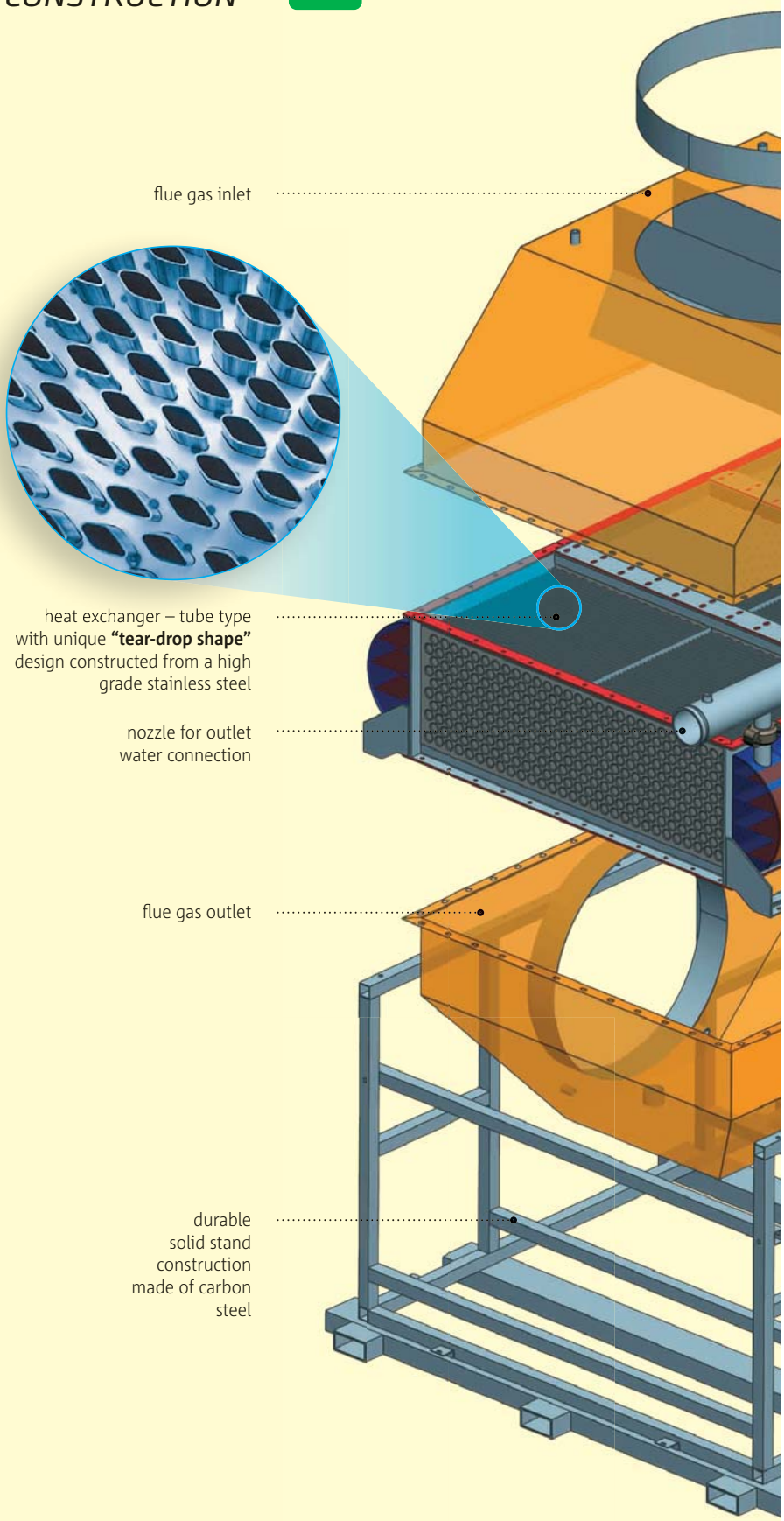
ECONOMIZER CONSTRUCTION MATERIAL:

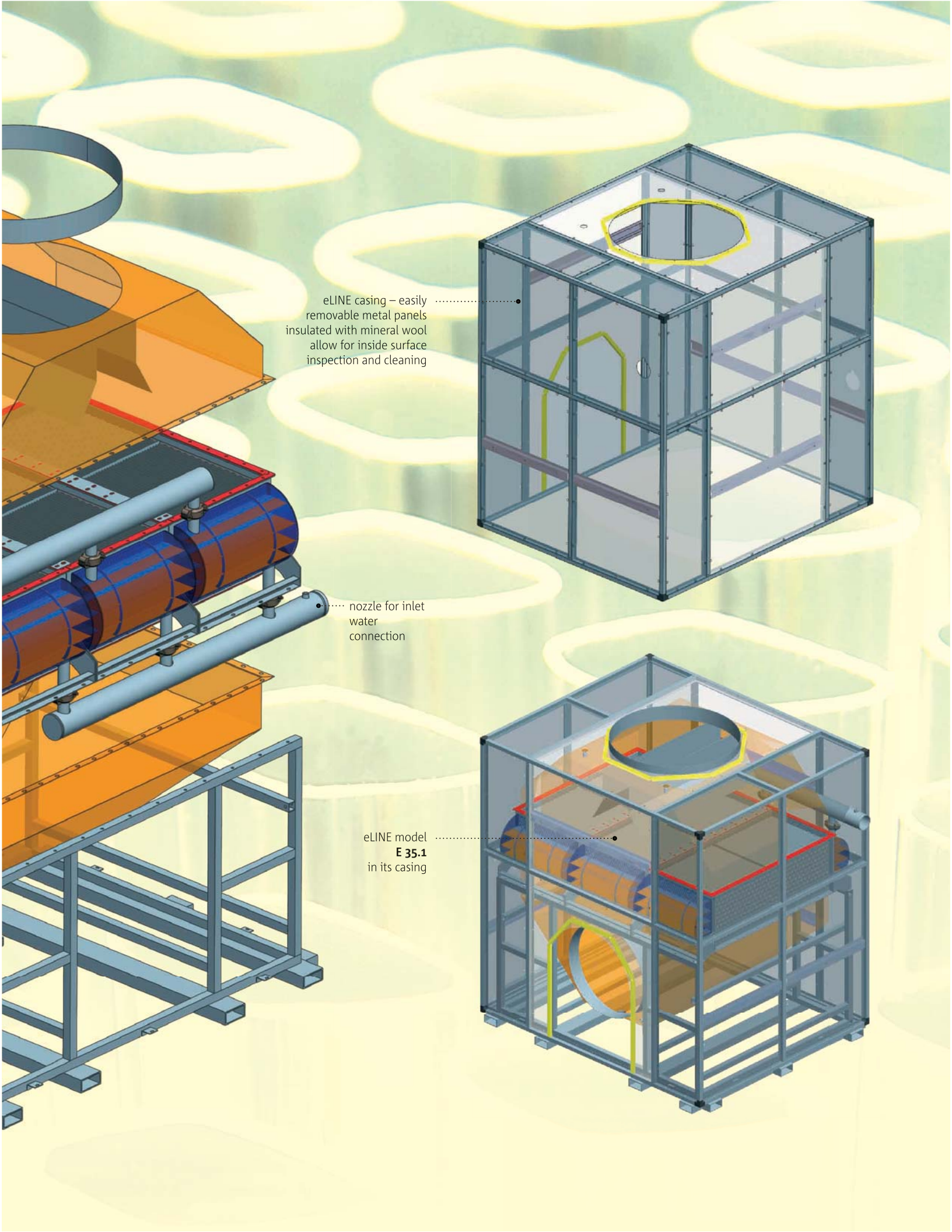
- **stainless steel 316L or 304L**
  - ***for economizers working with gas-fired boilers***
- **stainless steel 904L**
  - ***for economizers working with heavy-oil fired boilers (optional)***

WORKING PRESSURE 160 PSI

ECONOMIZER CONSTRUCTION

TEAR-DROP SHAPE




eLINE casing – easily removable metal panels insulated with mineral wool allow for inside surface inspection and cleaning
nozzle for inlet water connection
eLINE model **E 35.1** in its casing

INSTALLATION DIAGRAMS – DIFFERENT ARRANGEMENTS

DIAGRAM 1
eLINE economizer and boiler connected in series.

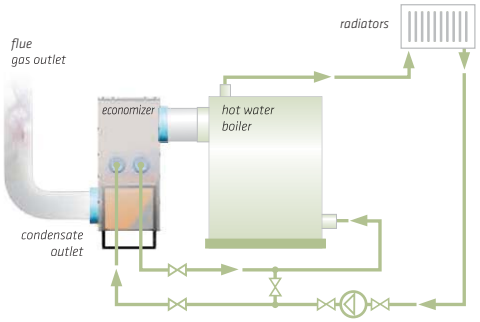


DIAGRAM 2
eLINE economizer and boiler connected in series with additional hydraulic clutch.

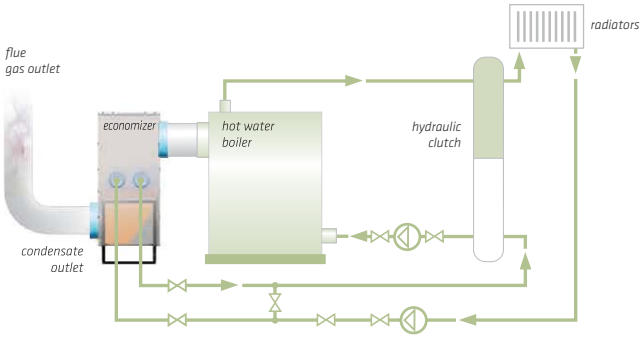


DIAGRAM 3
eLINE economizer and boiler with two additional hydraulic clutches and three-way valve.

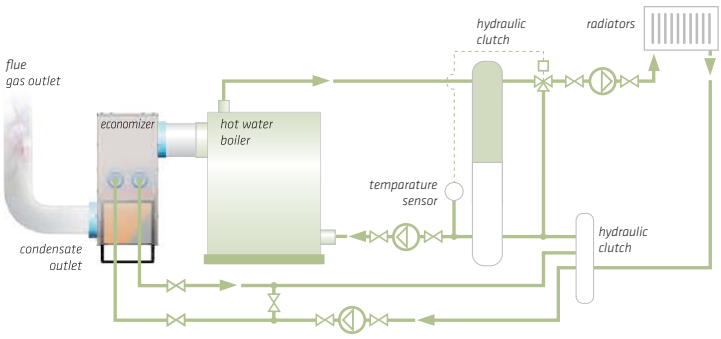


DIAGRAM 4
eLINE economizer and boiler with three additional hydraulic clutches and three-way valve.

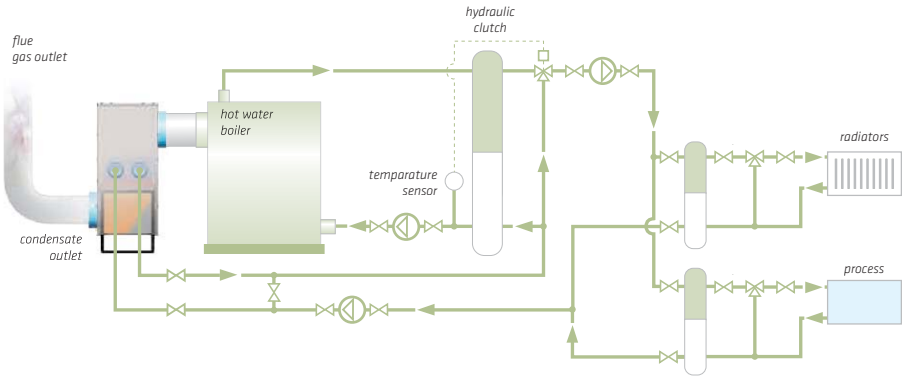
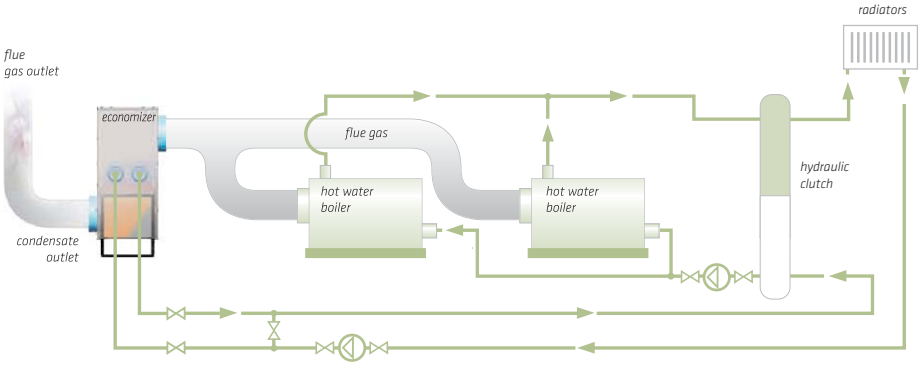
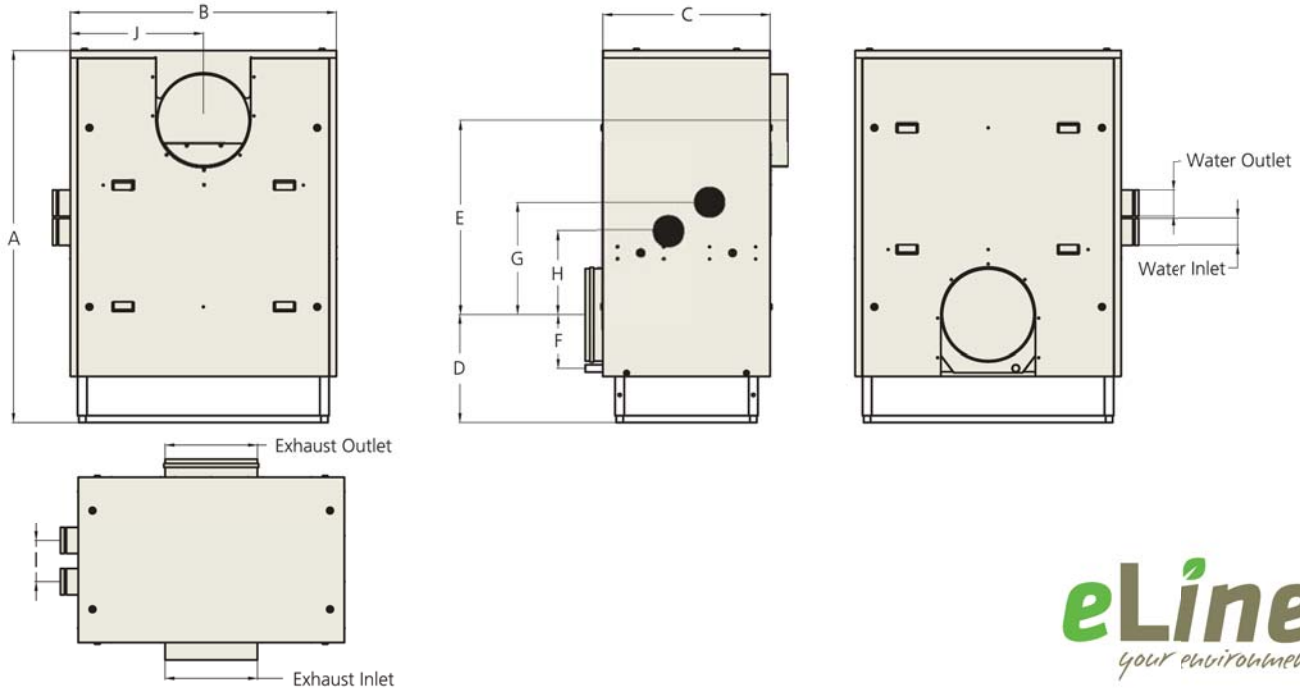


DIAGRAM 5
eLINE economizer and two boilers with hydraulic clutch.



Technical Product Specifications



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Connection dimensions

Model	Nominal Boiler Input		Exhaust Inlet		Exhaust Outlet		Water Inlet		Water Outlet		Drain Nozzle	
	kW	MBTUH	Ømm	øin	Ømm	øin	mm	in	mm	in	mm	in
E 8.1	150 - 250	500 - 850	200	8	200	8	DN65	2-1/2	DN65	2-1/2	DN20	3/4
E 12.1	200 - 500	650 - 1 700	300	12	300	12	DN65	2-1/2	DN65	2-1/2	DN20	3/4
E 15.1	450 - 1 200	1 500 - 4 100	400	16	400	16	DN100	4	DN100	4	DN20	3/4
E 16.1	1 100 - 1 500	3 750 - 5 100	400	16	400	16	DN100	4	DN100	4	DN20	3/4
E 20.1	1 400 - 2 000	4 800 - 6 850	500	20	500	20	DN150	6	DN150	6	DN20	3/4
E 28.1	3 000 - 4 000	10 240 - 13 650	700	28	700	28	DN150	6	DN150	6	DN50	2
E 35.1	4 500 - 6 000	13 650 - 20 475	900	35	700	28	DN150	6	DN150	6	DN50	2

Larger sizes (multiple-units) or custom-designed economizers available upon individual request.

Dimensions

Model	A		B		C		D min.		D max.		E		F		G		H		I		J	
	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
E 8.1	1 228	48.35	848	33.39	356	14.02	387	15.24	587	23.11	650	25.59	132	5.20	381	15.00	257	10.12	142	5.59	424	16.69
E 12.1	1 424	56.06	848	33.39	546	21.49	437	17.20	737	29.02	750	29.53	182	7.17	431	16.97	307	12.09	142	5.59	424	16.69
E 15.1	1 614	63.54	1 154	45.43	726	28.58	468	18.43	868	34.17	838	32.99	232	9.13	481	18.94	357	14.06	180	7.08	577	22.72
E 16.1	1 614	63.54	1 154	45.43	926	36.45	468	18.43	868	34.17	838	32.99	232	9.13	481	18.94	357	14.06	205	8.07	577	22.72
E 20.1	1 828	71.97	1 450	57.09	926	36.45	538	21.18	1 038	40.87	948	37.32	282	11.10	531	20.91	407	16.02	234	9.21	725	28.54
E 28.1	2 170	85.44	1 440	56.70	1 690	66.54	681	26.81	681	26.81	1 548	60.95	225	8.86	1 045	26.77	845	33.27	185	7.28	720	28.35
E 35.1	2 170	85.44	2 060	81.10	1 690	66.54	681	26.81	681	26.81	1 548	60.95	225	8.86	1 045	26.77	845	33.27	185	7.28	1 030	40.55

SEC is a designer and manufacturer of heat exchangers and heat transfer systems. Over the years, our creativity and engineering expertise have resulted in a comprehensive line of products utilizing advanced thermal processes and technologies.

We are certified by renowned international inspection authorities. Our quality process and management systems fulfill the requirements of ISO 9001 Quality Management System. ***SEC*** heat exchangers are designed, tested and manufactured in accordance with ASME (Section IV and VIII) and PED (97/23/UE) regulations.

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