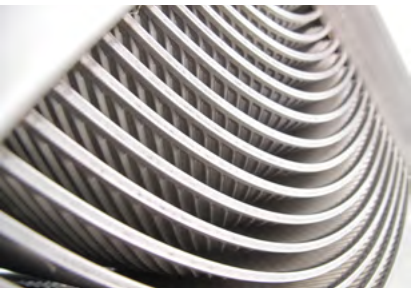
ACTE

Heat exchangers
design & manufacturing



GAP 50-3-3 Recuperator/Economizer

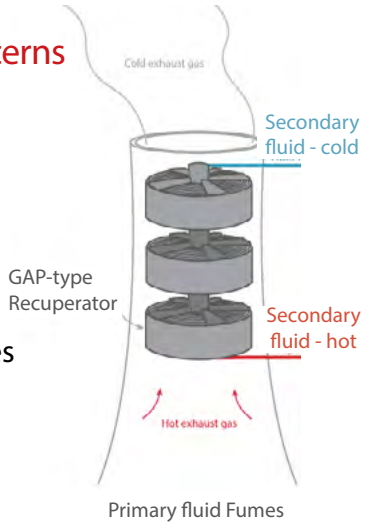
TECHNICAL DATASHEET

Exchanger type :
- Gas to Compressed air
- Gas to Liquid
- Compatible with phase change

Recovered thermal power from **100 to 900 kW**
Exhaust gas from 200°C to 700°C
Flow range from **2000 to 8000 Nm³/h**
Local pressure resistance up to 16 bars at 250°C

GAP 50-3-3: the answer to most heat recovery concerns

The GAP 50-3-3 waste heat recuperator has been the first standard product to be developed within the GAP range. Its features have been finetuned to allow it to answer most waste heat recovery needs within a large power range from 100 to 900 kW. The 3 mm gap between plates together with the overall size of this heat recuperator make it fit with many kinds of applications involving fumes or gas. The GAP 50-3-3 has been specially designed to fit within DN500 (20") chimney ducts.



WHY THE **GAP** HEAT RECUPERATORS

The ACTE GAP-type heat recuperators are at the cutting edge of small-size waste heat boiler technology. Thanks to the combination of performance, reliability and compactness, the GAP-type heat recuperators make waste heat recovery within reach of all industrial processes.

Size and weight: the combination of plates and pipes

Plate exchangers are much smaller and lighter than pipe exchangers. ACTE's GAP exchangers are manufactured using a clever mix of pipes and plates, allowing a closed volume in which a liquid can flow, providing a much larger surface area for the same length: the doublet.

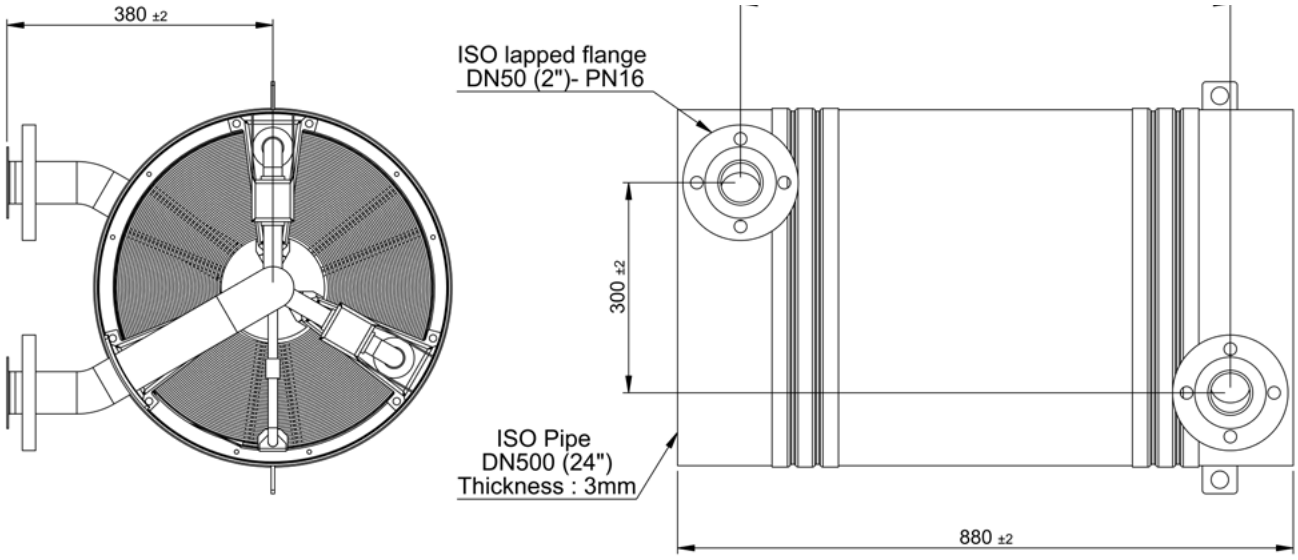
- Exchange surface of a 1" pipe: 0.08 m^2 per m
- Exchange surface of a doublet: 0.8 m^2 per m

Thanks to this, GAP recuperators allow energy optimisation on smaller size processes for which casual solutions are not suitable.

Pressure drops and particles: the benefits from the «gap» between plates

The bright idea reagarding the GAP technology is the space offered between each turn of plate. Thanks to this, the fumes path goes easily through the heat exchanger and the heat recovery is made with low impact on the industrial process.

Heat exchanger overview



Mechanical features:

Size and weight:

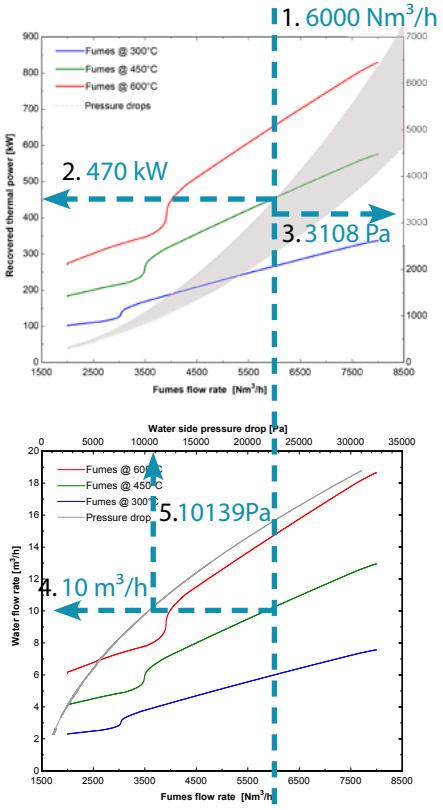
Duct connexion on the Primary side: DN500
Duct connexion on the Secondary side: DN50
Overall dimensions: Ø512 x 880 mm
Weight: 90 kg

Primary exchange surface:

Projected surface: 14.22 m^2
Gap between plates: 3 mm

Technical features:

To estimate your recuperator performances, please apply the following steps. First of all, please refer to the column corresponding to the chosen coolant (water or thermal oil).



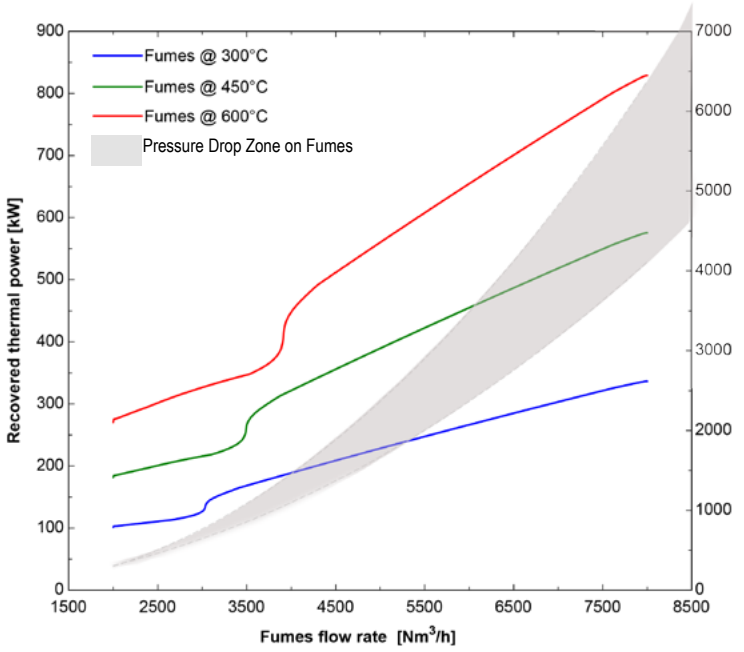
Then apply the 5-stages procedure below:

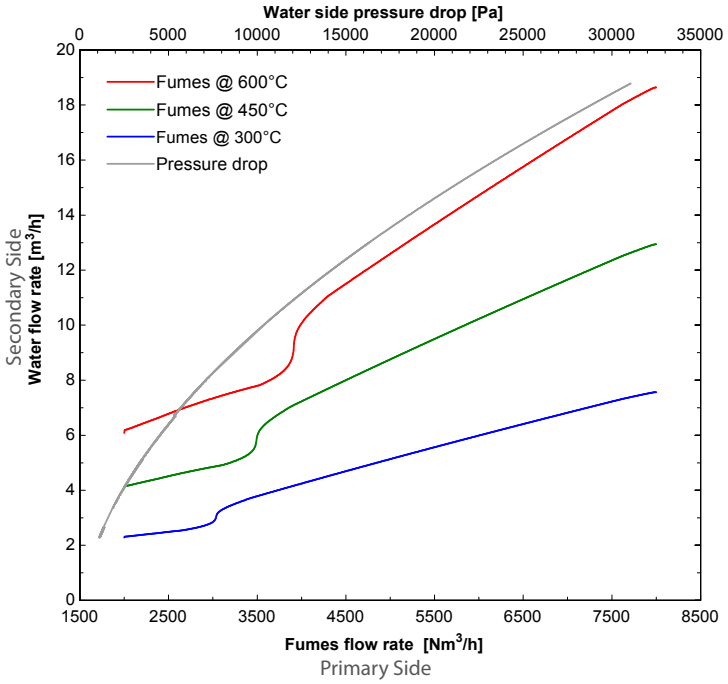
1. Trace a vertical straight line through the two graphs corresponding to the available gas (fumes) flow rate.
2. Depending on the temperature of the fumes, read the thermal power recovered on the left axis.
3. Read the pressure drop on the gases (fumes) from the blue curve and the right axis.
4. On the bottom graph, read the water flow rate on the left axis from the curve corresponding to the temperature of the gases (fumes).
5. Read the pressure drop on the water on the top axis from the blue curve (pressure drop).

Example:
Let's consider an application where the available fumes flow rate is 6000 Nm^3 per hour and the temperature is 450°C:

- The power recovered is therefore 470 kW
- The pressure drop on the fumes is 3108 Pa
- The corresponding flow rate is 10 m^3 per hour
- The pressure drop on the water is 10139 Pa

Water with 20% glycol

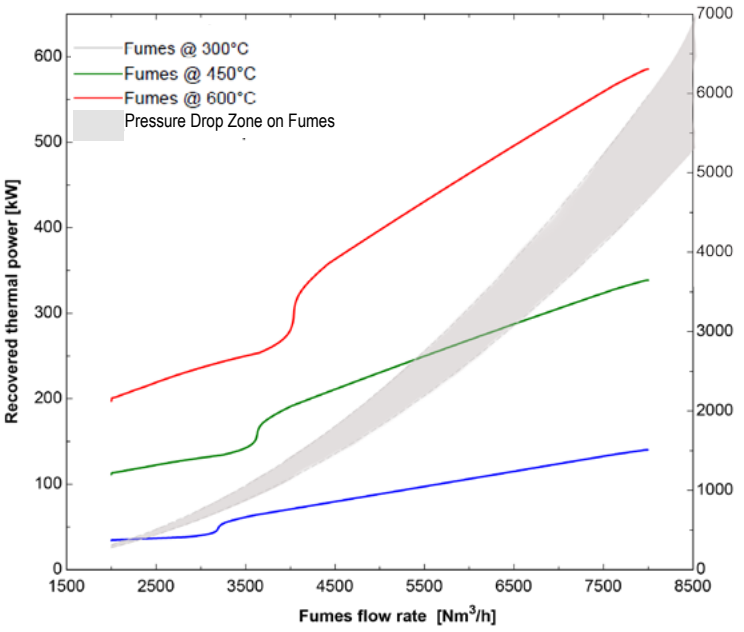


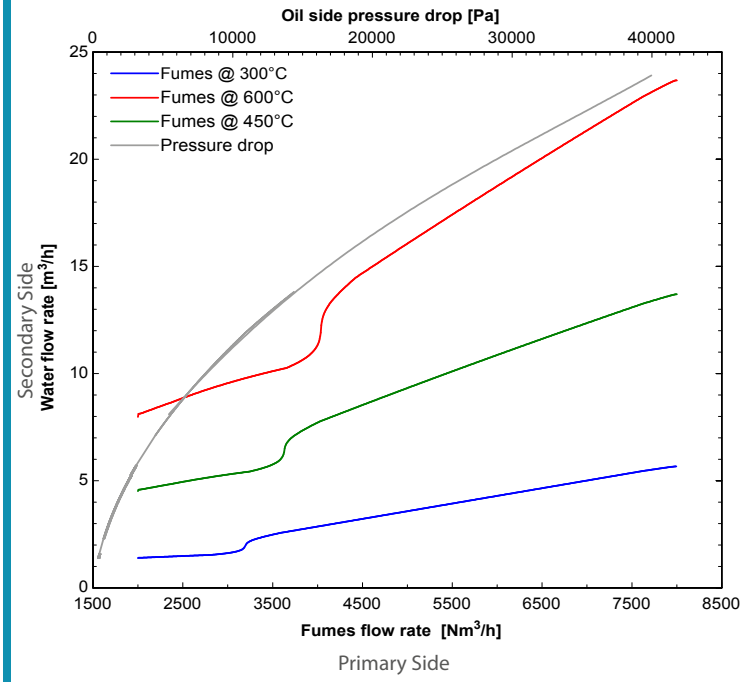


The flow rates given above have been calculated for a temperature difference of 40°C (temperature range : 50-90°C).
For any other temperature difference, the corresponding water flow rate is obtained using the formula below. The corresponding pressure drop is then determined following the initial procedure.

$$\frac{\text{Power [kW]}}{\text{15.0732e6 x } \Delta T\ [°C]} = \text{Water flow rate [m}^3\text{/h]}$$

Thermal oil





The flow rates given above have been calculated for a temperature difference of 50°C (temperature range : 200-250°C).
For any other temperature difference, the corresponding thermal oil flow rate is obtained using the formula below. The corresponding pressure drop is then determined following the initial procedure.

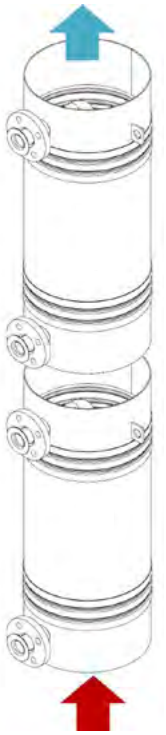
$$\frac{\text{Power [kW]}}{\text{6.4084e6 x } \Delta T\ [°C]} = \text{Oil flow rate [m}^3\text{/h]}$$

(1) Note: the grey zone corresponds to the pressure drop range for fumes from 300°C to 600°C. To read the pressure drop related to your design point on the fumes side, please consider that the higher the fumes temperature, the higher the pressure drop.

Exchangers in parallel:

If the drop in pressure on the fumes is too great, it is always possible to put two exchangers in parallel, which will have the effect of dividing the fume flow rate by two. The thermal power recovered then represents twice the power given by the graph. The liquid flow rate to be taken into account is also twice that given by the graph.

For instance: for a flow rate of 8000 Nm^3 per hour at 450°C, the graph indicates a pressure drop of 4500 Pa, which may be too high according to your specification. By putting two exchangers in parallel the fumes flow rate under consideration is then 4000 Nm^3 per hour with the result that the pressure drop is 1450 Pa.



Exchangers in line:

If the drop in pressure on the fumes, calculated from the graph, is lower than the acceptable value for your system, it is then possible to recover more heat by using a second exchanger in line with the first one.
The pressure drop on the fumes is then double the initial value. In this case, please contact us for an estimate of other values.

Notes:

1. The graphs shown above give the possibility of drawing up an initial technical validation from the values of your thermal energy source. Please note that you are welcome to contact us for further technical details.

2. For any sizing where hot gas is used to reheat the air or for generating steam, please contact us directly.

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