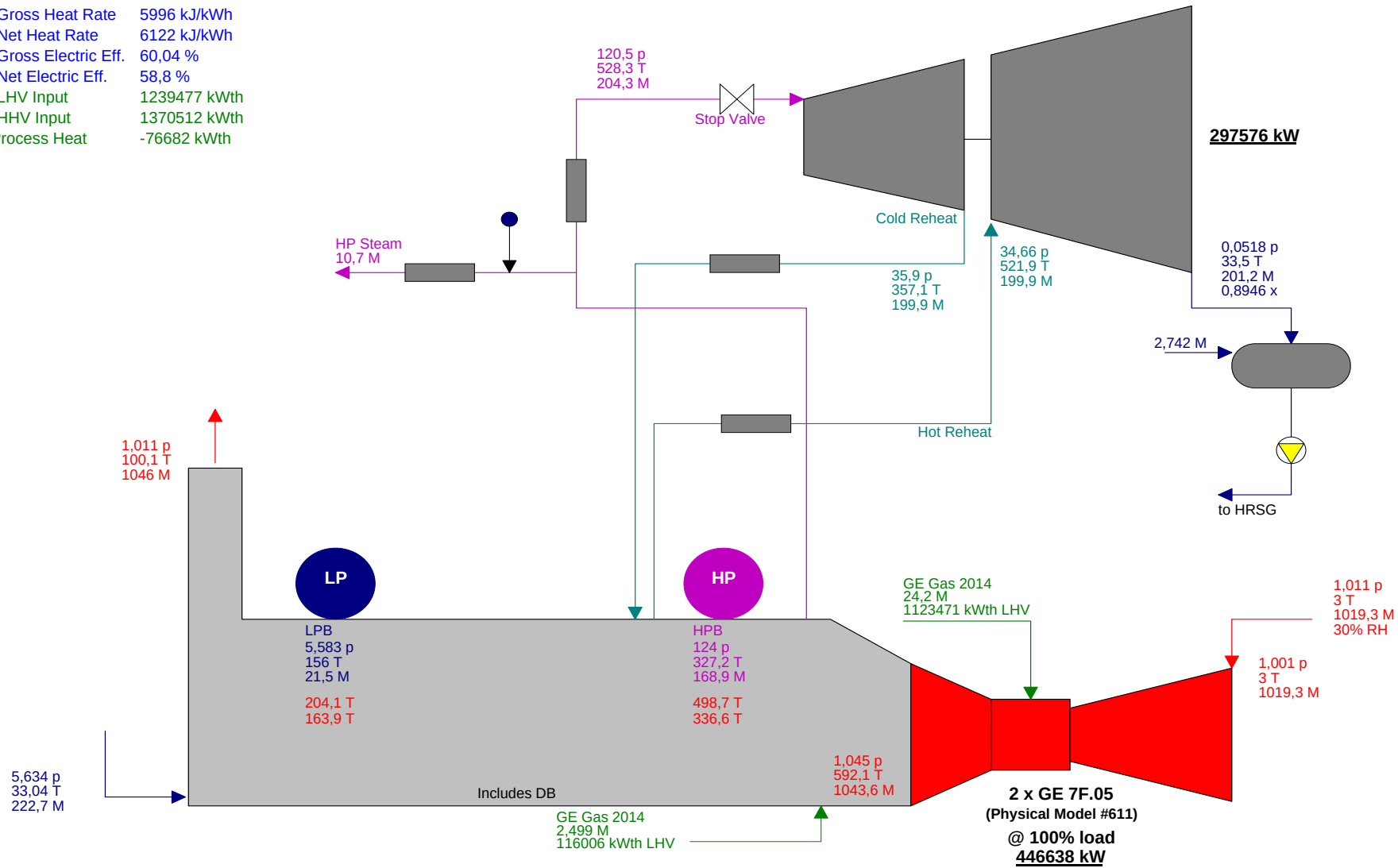


GT MASTER 27.0 Tractebel Engineering

Gross Power 744215 kW
 Net Power 728811 kW
 Aux. & Losses 15404 kW
 LHV Gross Heat Rate 5996 kJ/kWh
 LHV Net Heat Rate 6122 kJ/kWh
 LHV Gross Electric Eff. 60,04 %
 LHV Net Electric Eff. 58,8 %
 Fuel LHV Input 1239477 kWth
 Fuel HHV Input 1370512 kWth
 Net Process Heat -76682 kWth

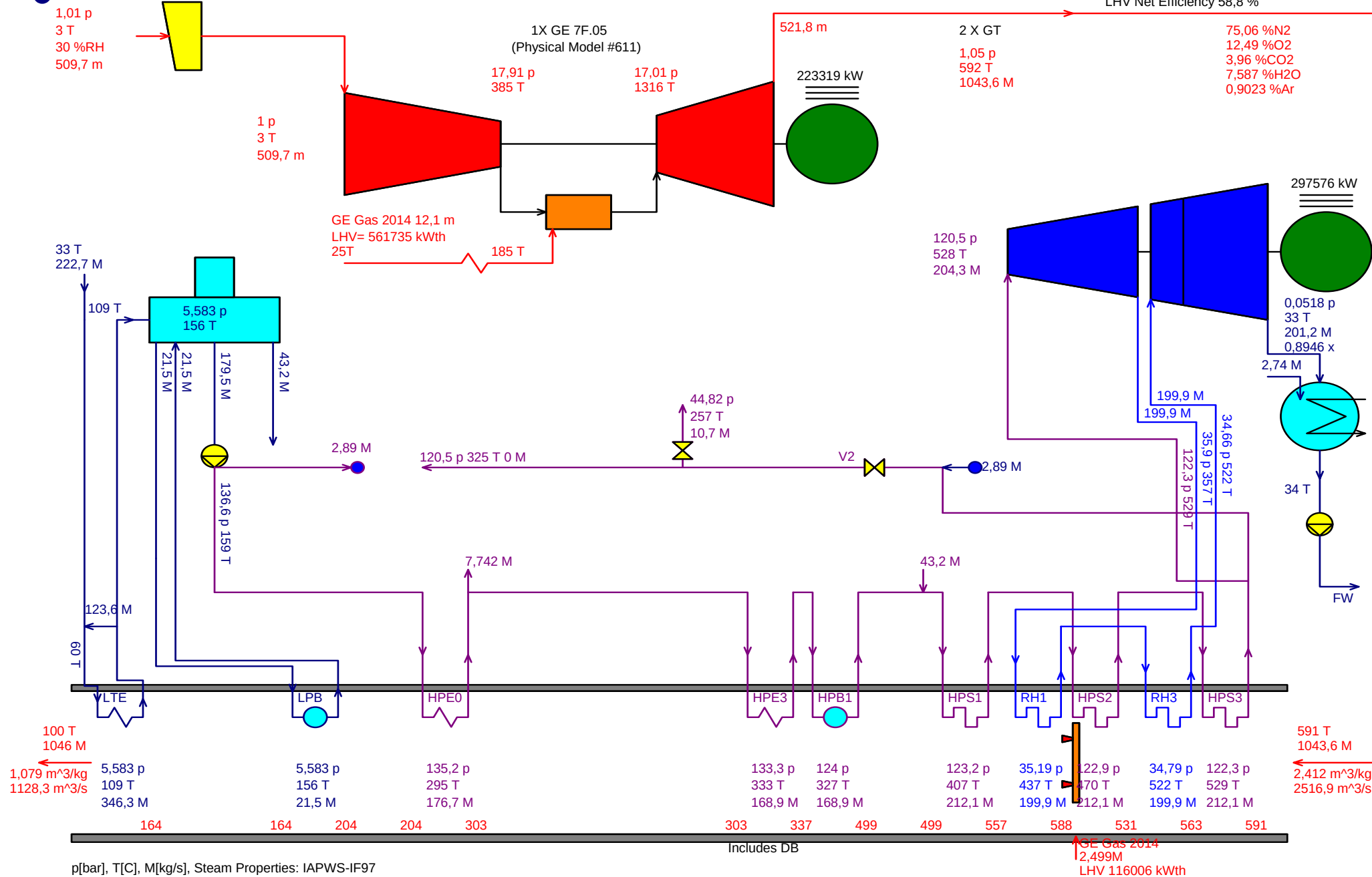
Ambient
 1,011 P
 3 T
 30% RH



p [bar] T [C] M [kg/s], Steam Properties: IAPWS-IF97

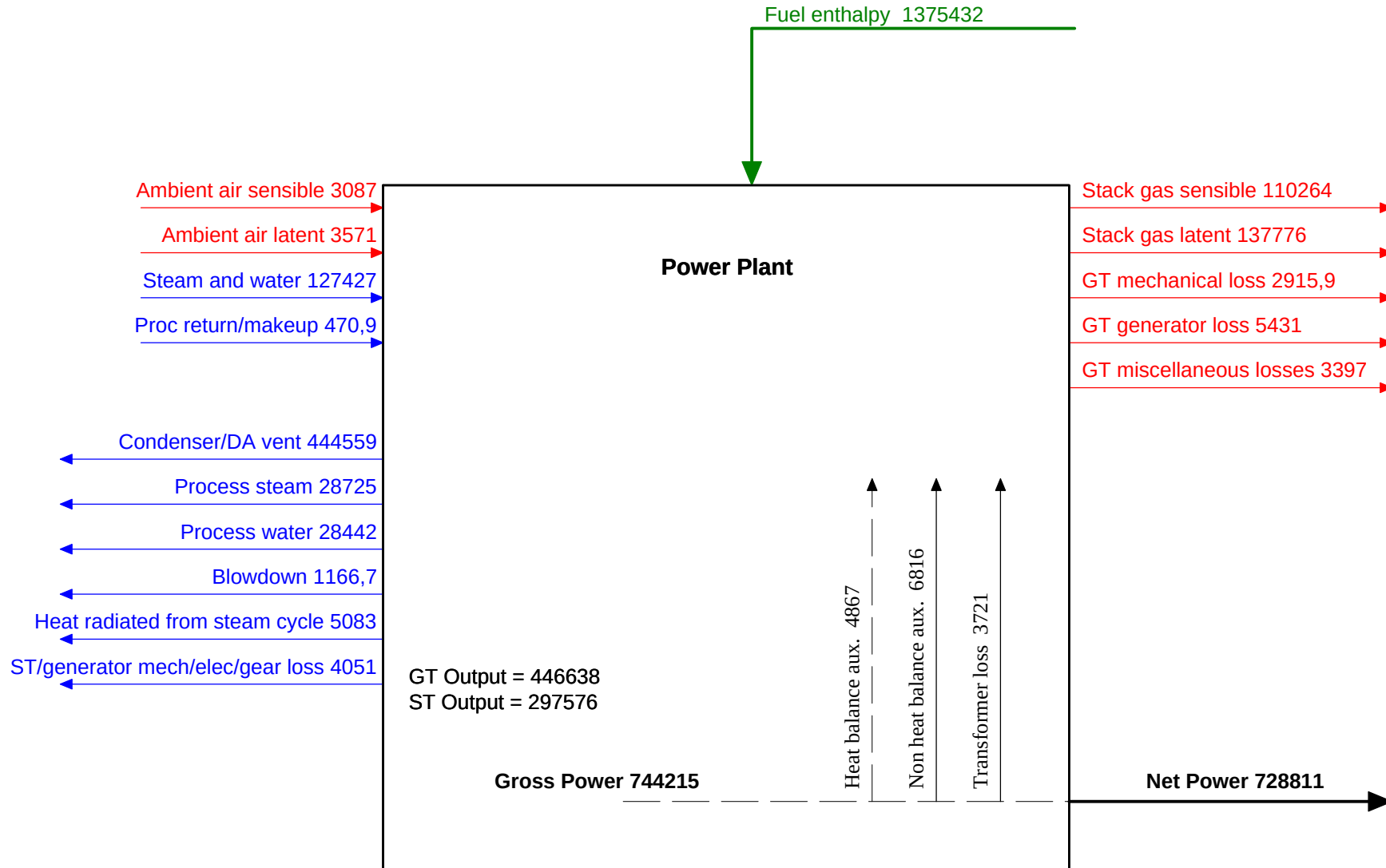
9501 05-30-2018 09:57:49 file=C:\Users\IEJ351\Documents\Duba\Duba2.GTM

GT MASTER 27.0 Tractebel Engineering



Fuel chemical LHV input = 1239477 kW
Fuel chemical HHV input = 1370512 kW

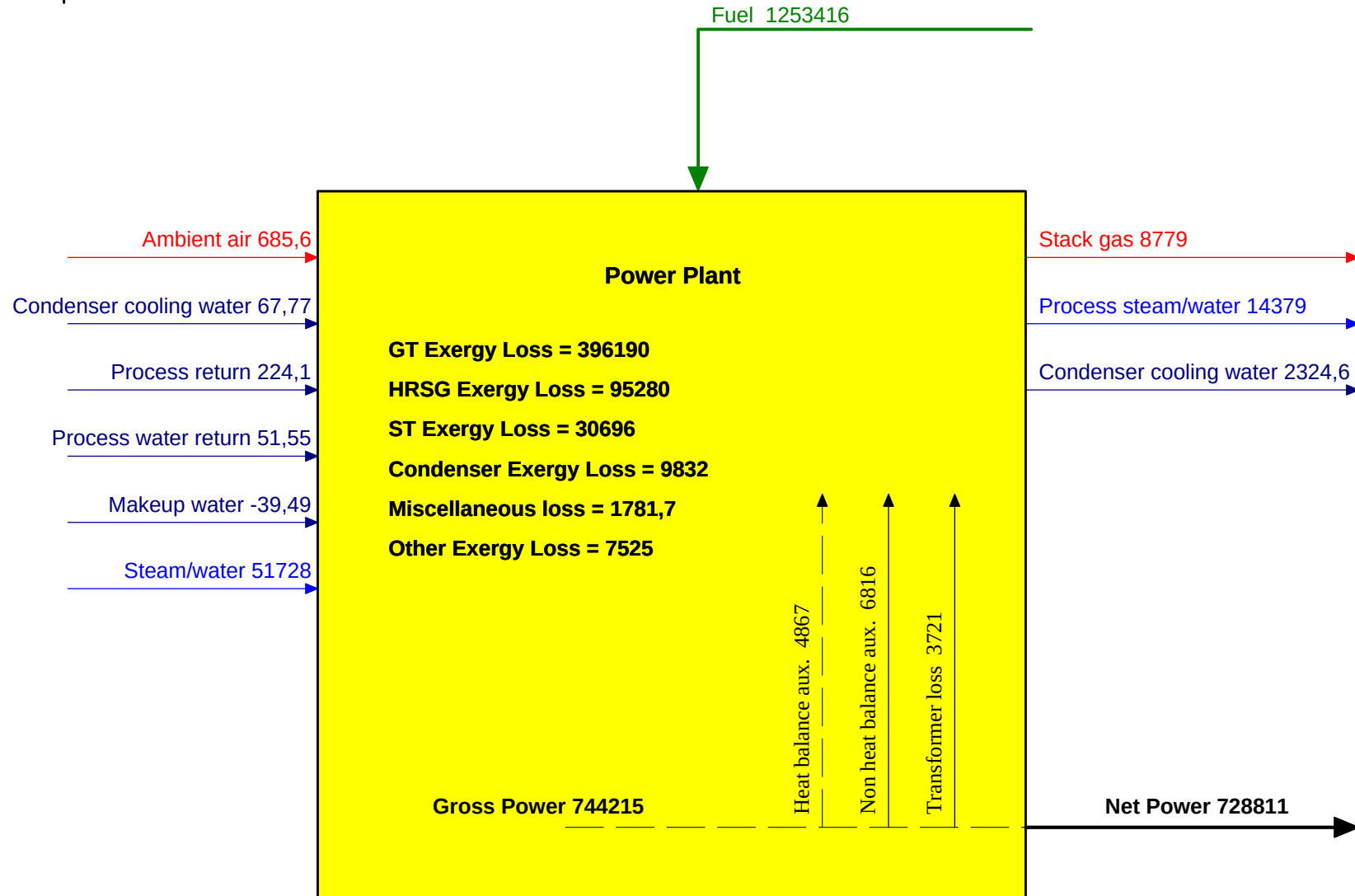
Power Plant Energy Flow Schematic [kW]



Zero enthalpy: dry gases & liquid water @ 32 F (273.15 K)

Fuel exergy input = 1253416 kW
Fuel chemical LHV input = 1239477 kW
Fuel chemical HHV input = 1370512 kW

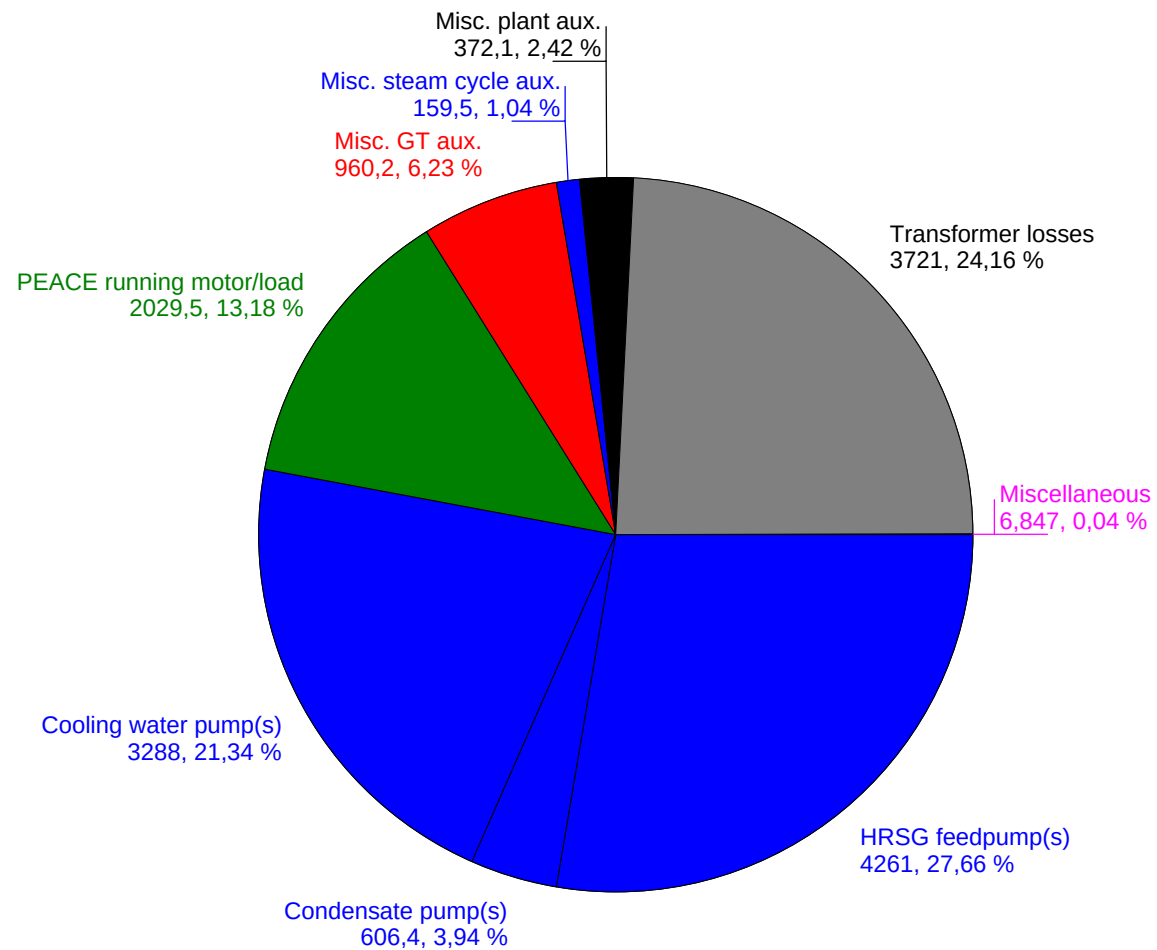
Power Plant Exergy Flow Schematic [kW]



Reference: 1.013 bar, 25 C, water as vapor.

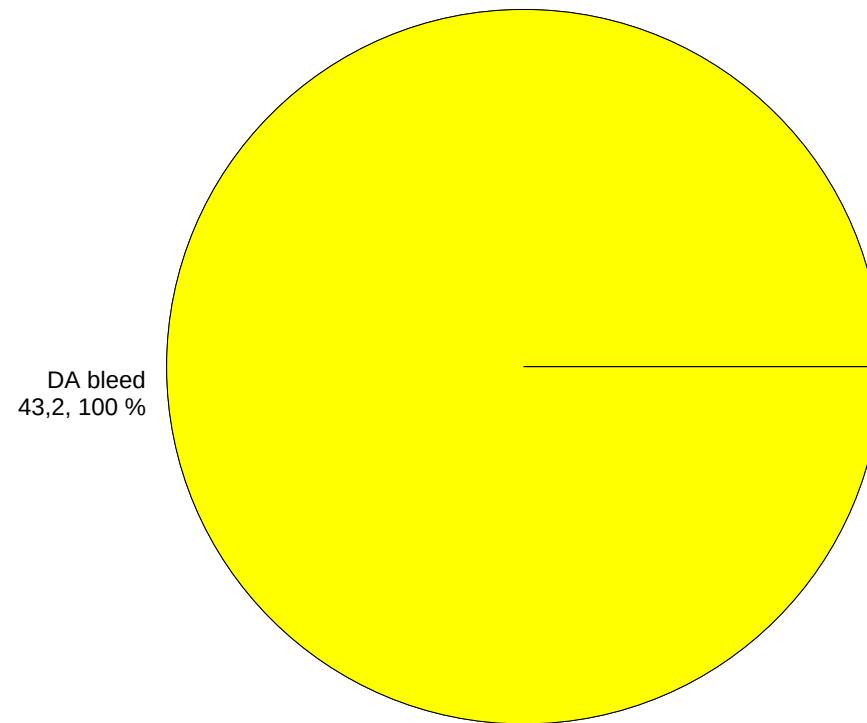
Auxiliaries & Losses [kW]

Total auxiliaries & transformer losses = 15404 kW

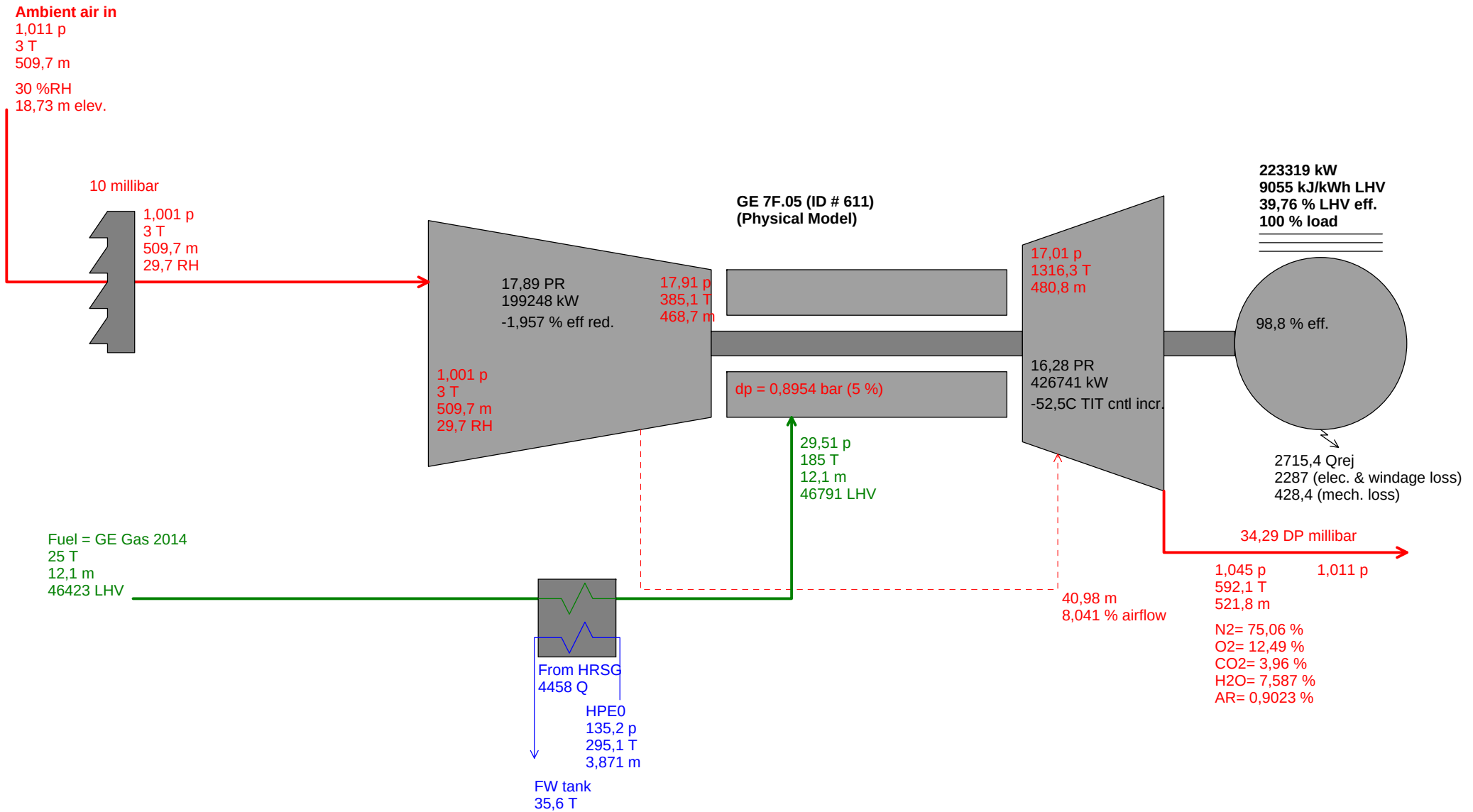


Plant Water Consumption [kg/s]

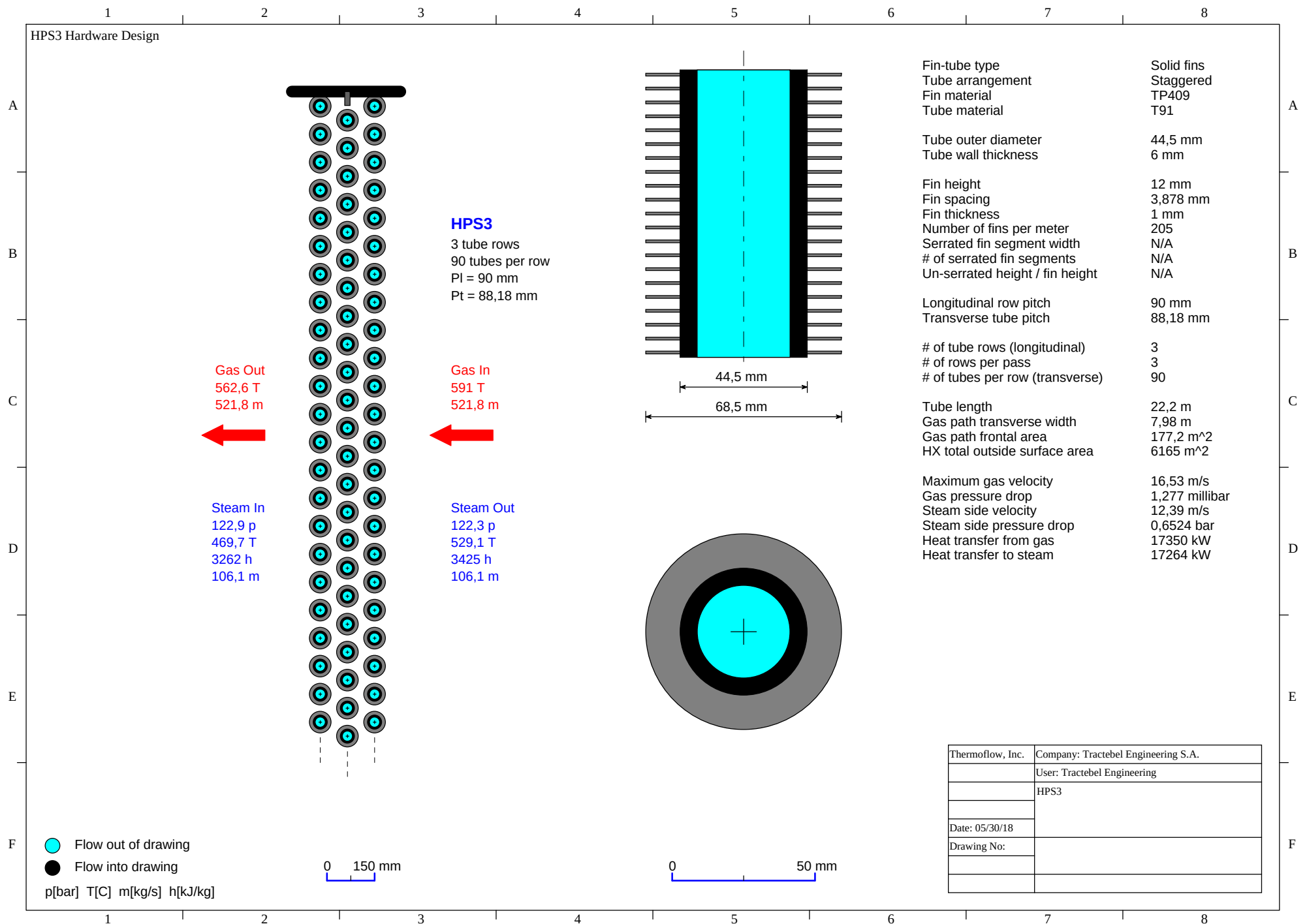
Plant water consumption = -42,85 kg/s

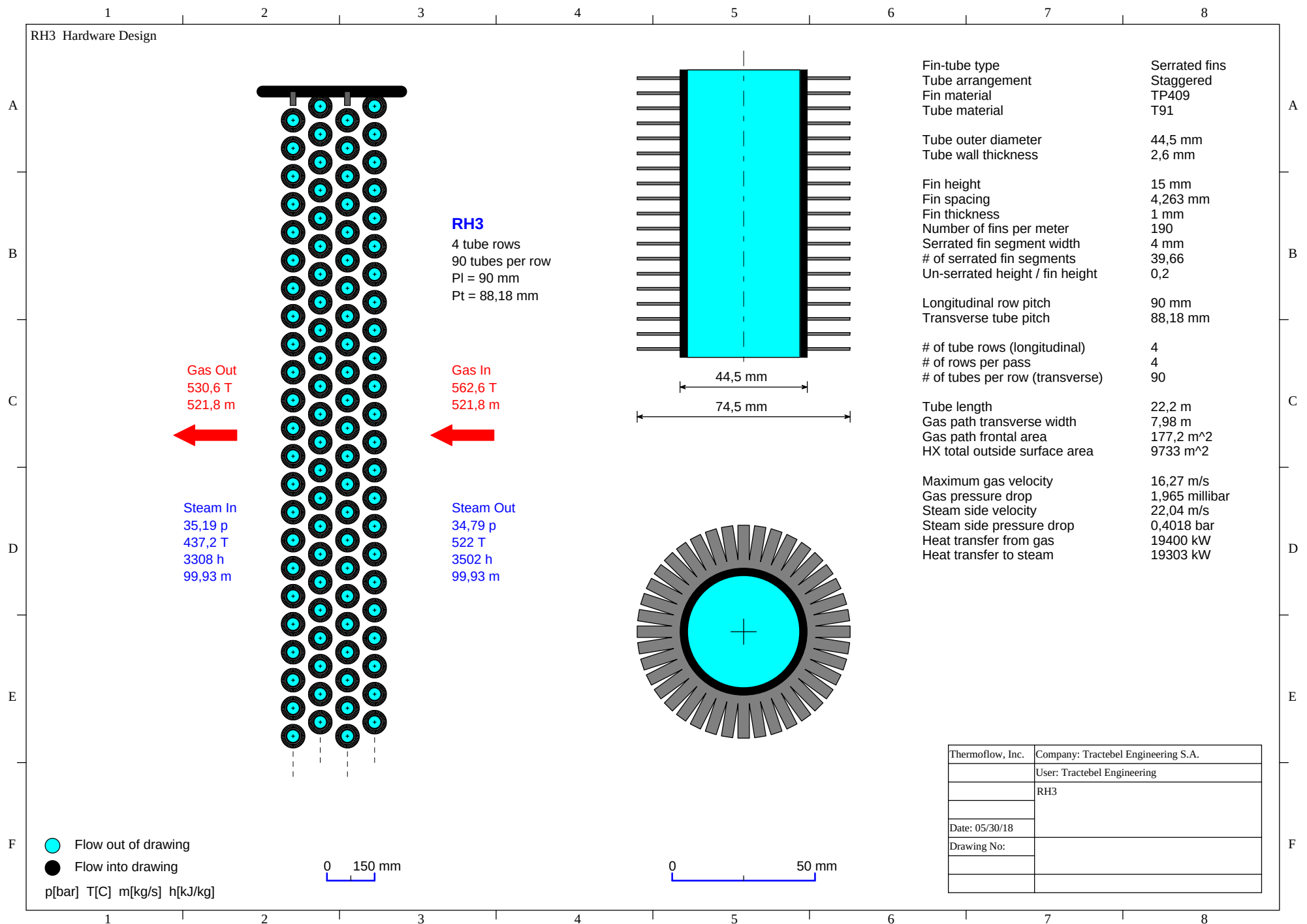


GT generator power = 223319 kW
 GT Heat Rate @ gen term = 9055 kJ/kWh
 GT efficiency @ gen term = 35,95% HHV = 39,76% LHV
 GT @ 100 % rating, inferred TIT control model, CC limit



p[bar], T[C], M[kg/s], Q[kW], Steam Properties: IAPWS-IF97





ThermoFlow, Inc.	Company: Tractebel Engineering S.A.
	User: Tractebel Engineering
	RH3
Date: 05/30/18	
Drawing No:	

[illegible]

HPS2 Hardware Design

The drawing consists of three main views: a front view (left), a side view (top center), and a top view (bottom center). The front view shows a vertical array of tubes with flow directions indicated by red arrows (Gas In/Out) and blue arrows (Steam In/Out). The side view shows the tube bundle's profile with dimensions. The top view shows the circular arrangement of fins around the tube bundle.

HPS2

3 tube rows
90 tubes per row
PI = 90 mm
Pt = 88,18 mm

Gas Out
496,3 T
521,8 m

Gas In
530,6 T
521,8 m

Steam In
123,2 p
406,8 T
3068 h
106,1 m

Steam Out
122,9 p
469,7 T
3262 h
106,1 m

0 150 mm

0 50 mm

Fin-tube type
Tube arrangement
Fin material
Tube material

Serrated fins
Staggered
TP409
T91

Tube outer diameter
Tube wall thickness

44,5 mm
4 mm

Fin height
Fin spacing
Fin thickness
Number of fins per meter
Serrated fin segment width
of serrated fin segments
Un-serrated height / fin height

15 mm
3,348 mm
1 mm
230
4 mm
39,66
0,2

Longitudinal row pitch
Transverse tube pitch

90 mm
88,18 mm

of tube rows (longitudinal)
of rows per pass
of tubes per row (transverse)

3
3
90

Tube length
Gas path transverse width
Gas path frontal area
HX total outside surface area

22,2 m
7,98 m
177,2 m²
8660 m²

Maximum gas velocity
Gas pressure drop
Steam side velocity
Steam side pressure drop
Heat transfer from gas
Heat transfer to steam

16,12 m/s
1,715 millibar
8,552 m/s
0,326 bar
20693 kW
20590 kW

Thermoflow, Inc.
Company: Tractebel Engineering S.A.
User: Tractebel Engineering
HPS2
Date: 05/30/18
Drawing No:

Flow out of drawing
Flow into drawing

p[bar] T[C] m[kg/s] h[kJ/kg]

HPS2 Hardware Design

1 2 3 4 5 6 7 8

The drawing consists of three main views: a front view (left), a side view (top center), and a top view (bottom center). The front view shows a vertical array of tubes with flow directions indicated by red arrows (Gas In/Out) and blue arrows (Steam In/Out). The side view shows the profile of the tube bundle with dimensions 44,5 mm and 74,5 mm. The top view shows the circular arrangement of fins around the tube.

HPS2

3 tube rows
90 tubes per row
PI = 90 mm
Pt = 88,18 mm

Gas Out
496,3 T
521,8 m

Gas In
530,6 T
521,8 m

Steam In
123,2 p
406,8 T
3068 h
106,1 m

Steam Out
122,9 p
469,7 T
3262 h
106,1 m

0 150 mm

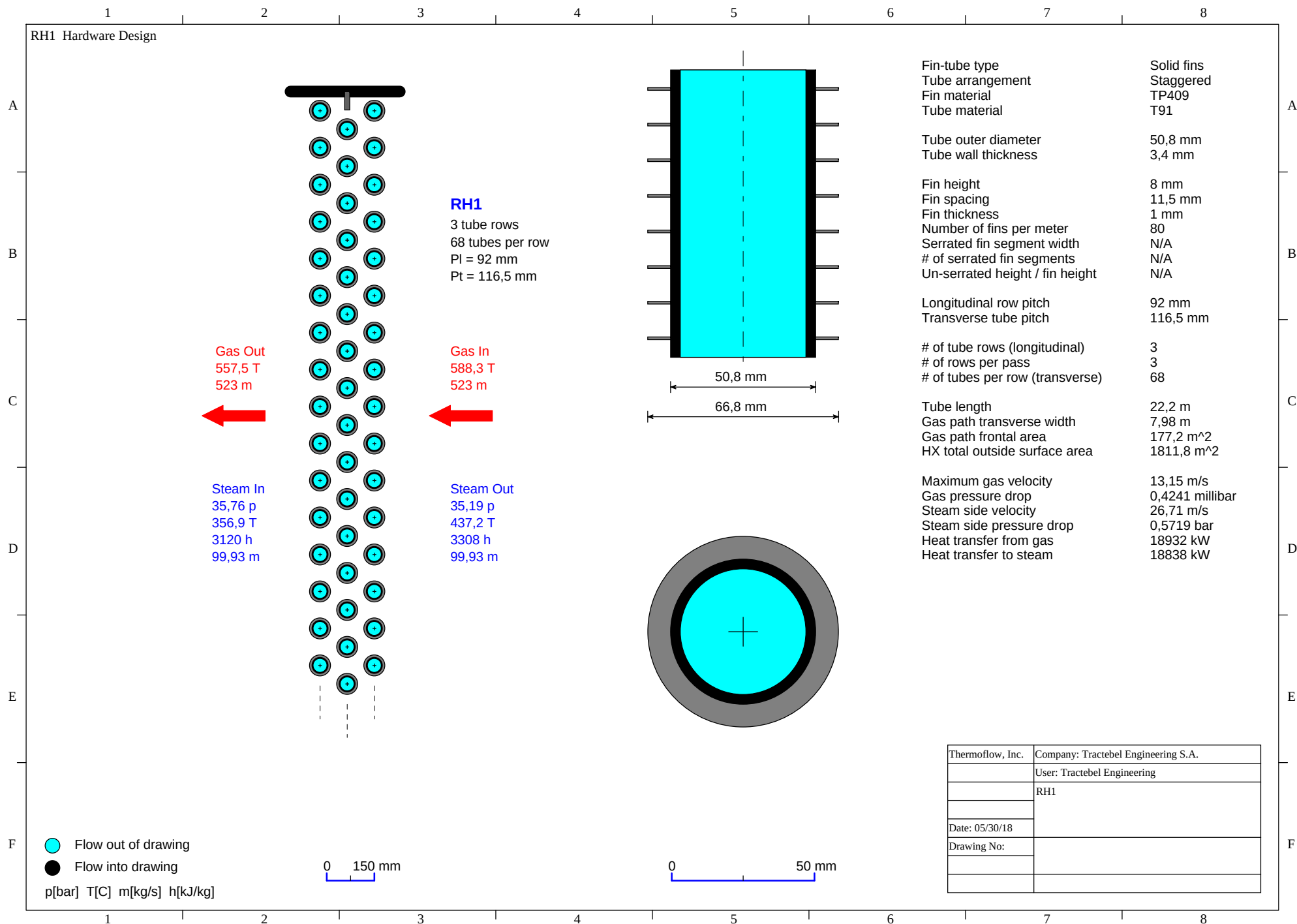
0 50 mm

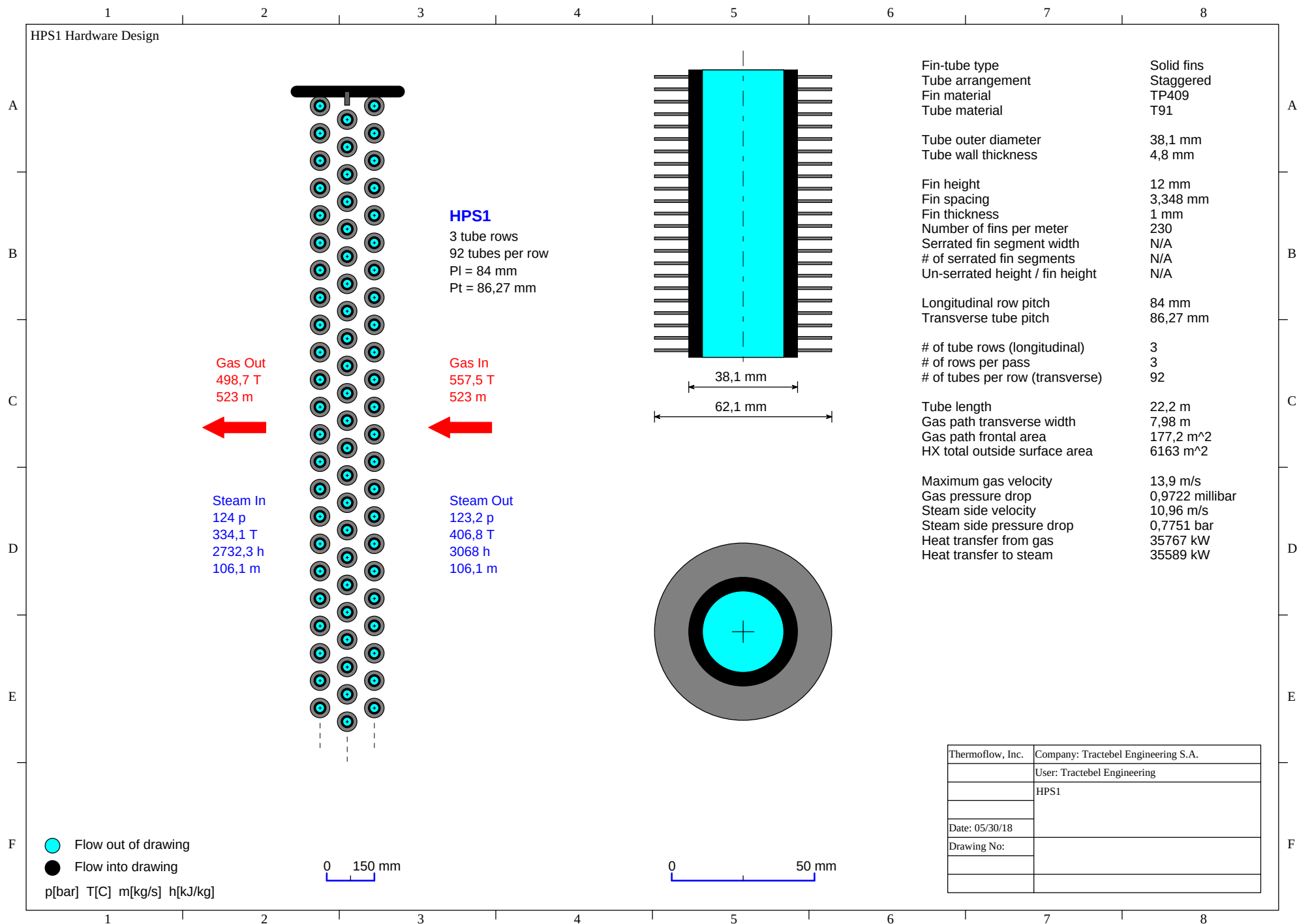
Fin-tube type	Serrated fins
Tube arrangement	Staggered
Fin material	TP409
Tube material	T91
Tube outer diameter	44,5 mm
Tube wall thickness	4 mm
Fin height	15 mm
Fin spacing	3,348 mm
Fin thickness	1 mm
Number of fins per meter	230
Serrated fin segment width	4 mm
# of serrated fin segments	39,66
Un-serrated height / fin height	0,2
Longitudinal row pitch	90 mm
Transverse tube pitch	88,18 mm
# of tube rows (longitudinal)	3
# of rows per pass	3
# of tubes per row (transverse)	90
Tube length	22,2 m
Gas path transverse width	7,98 m
Gas path frontal area	177,2 m ²
HX total outside surface area	8660 m ²
Maximum gas velocity	16,12 m/s
Gas pressure drop	1,715 millibar
Steam side velocity	8,552 m/s
Steam side pressure drop	0,326 bar
Heat transfer from gas	20693 kW
Heat transfer to steam	20590 kW

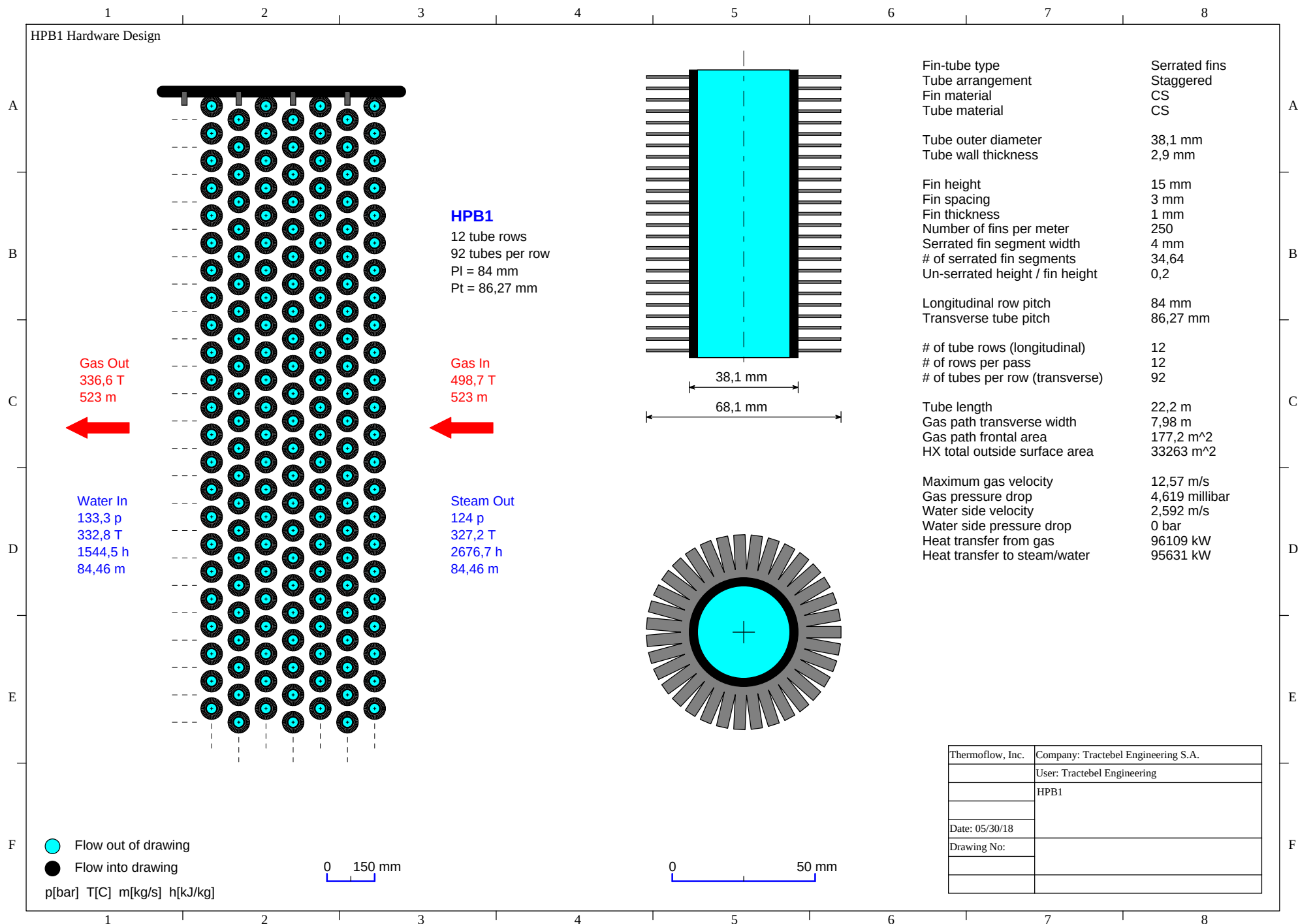
Thermoflow, Inc.	Company: Tractebel Engineering S.A.
	User: Tractebel Engineering
	HPS2
Date: 05/30/18	
Drawing No:	

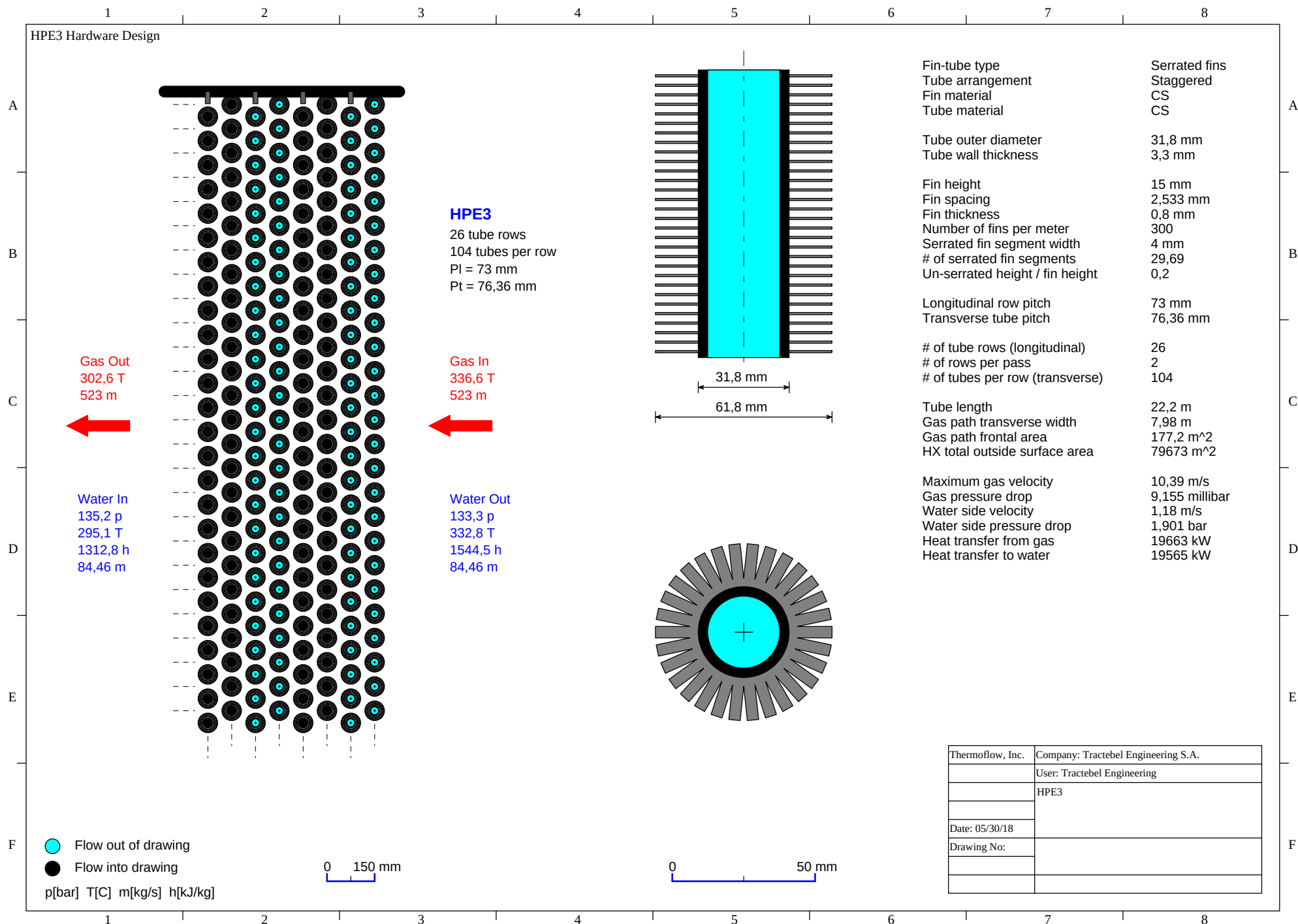
● Flow out of drawing
● Flow into drawing

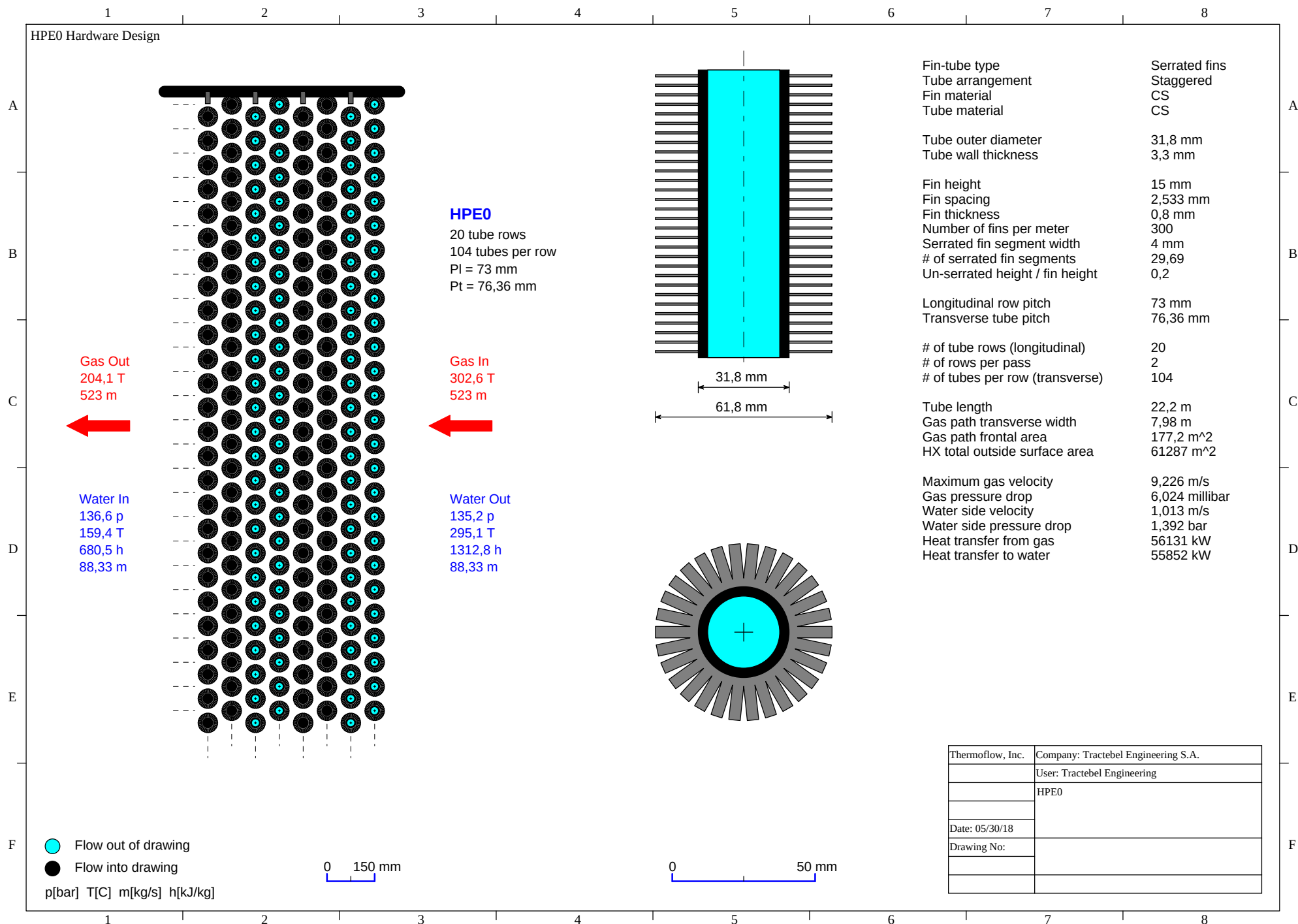
p[bar] T[C] m[kg/s] h[kJ/kg]

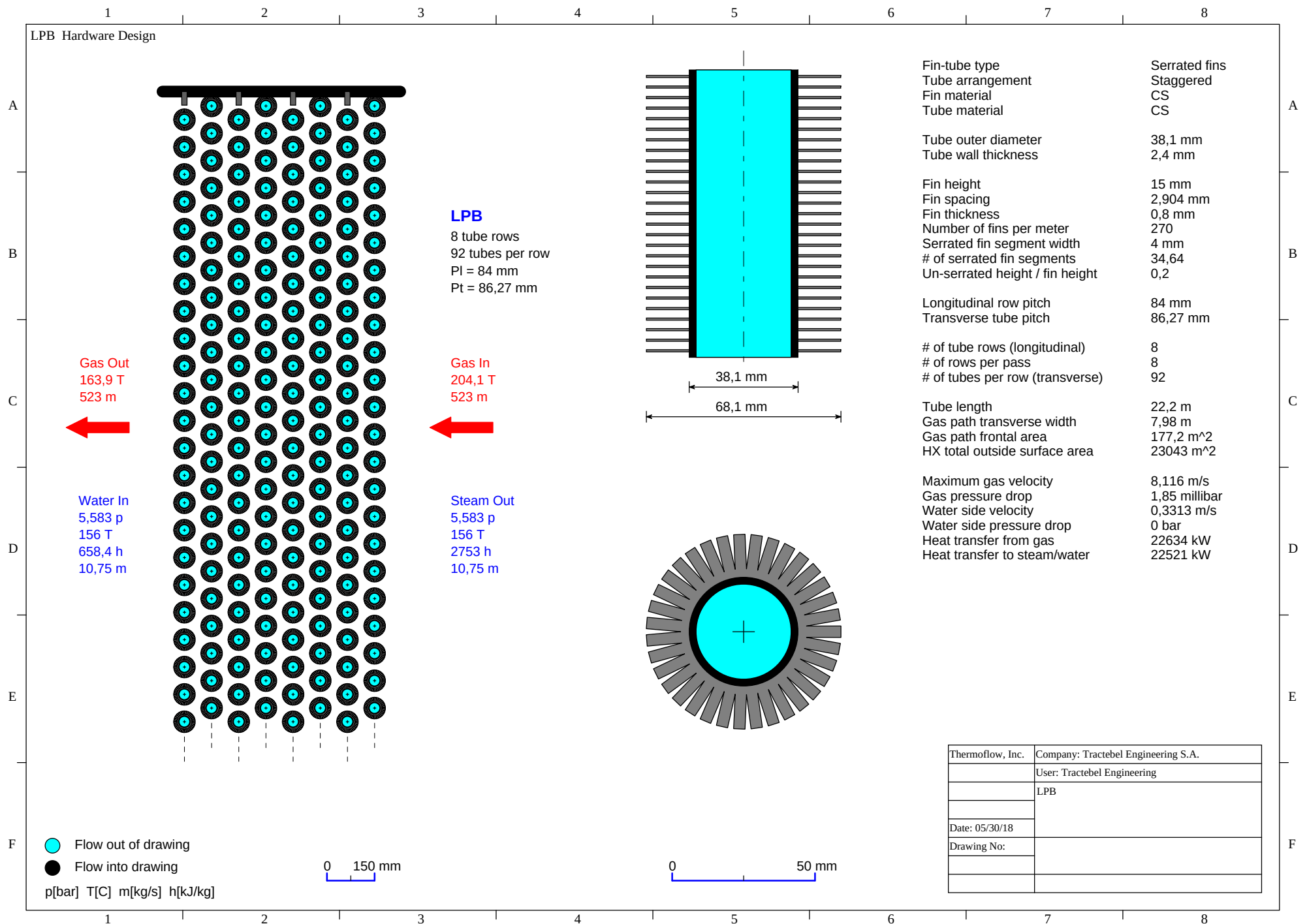


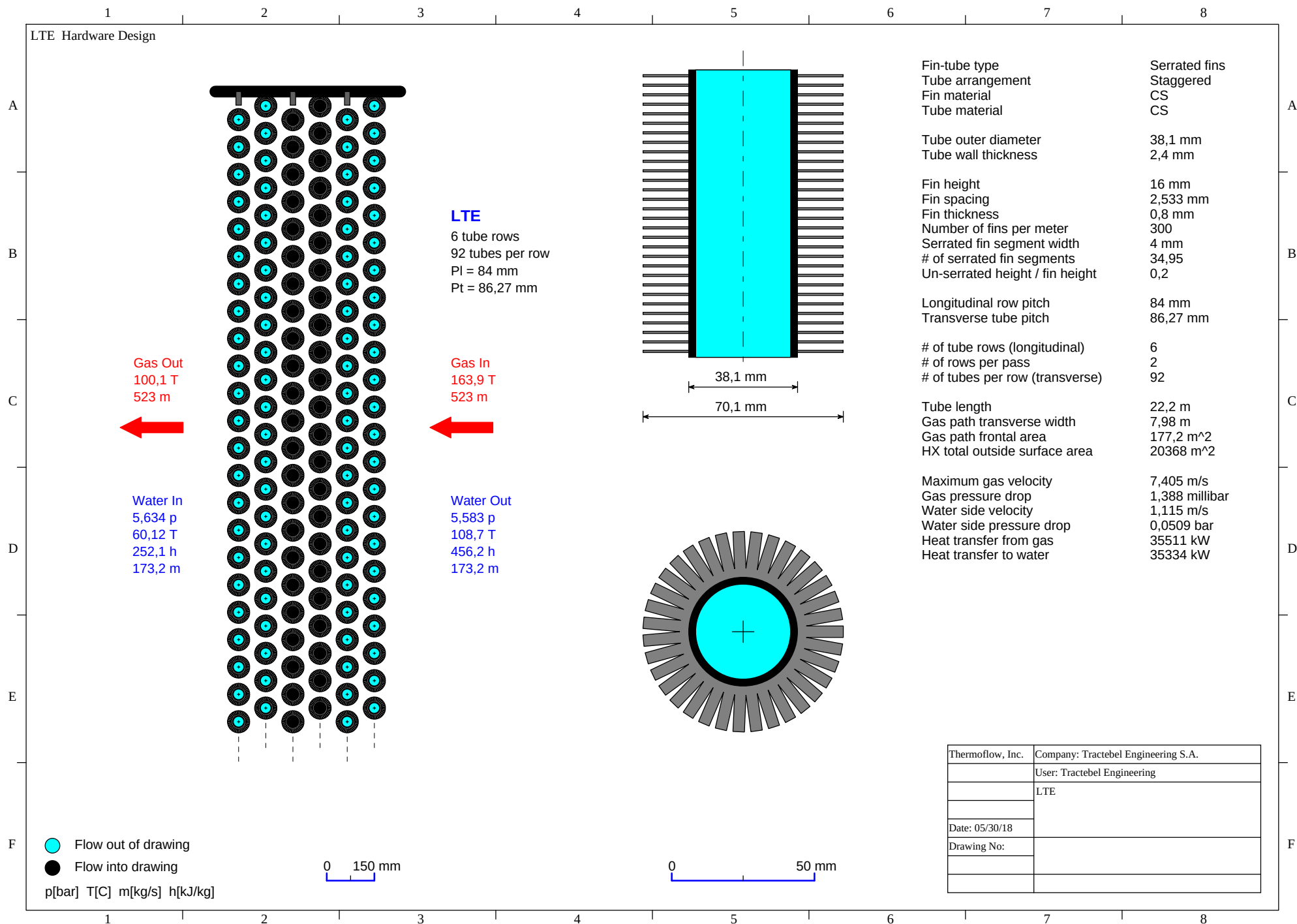


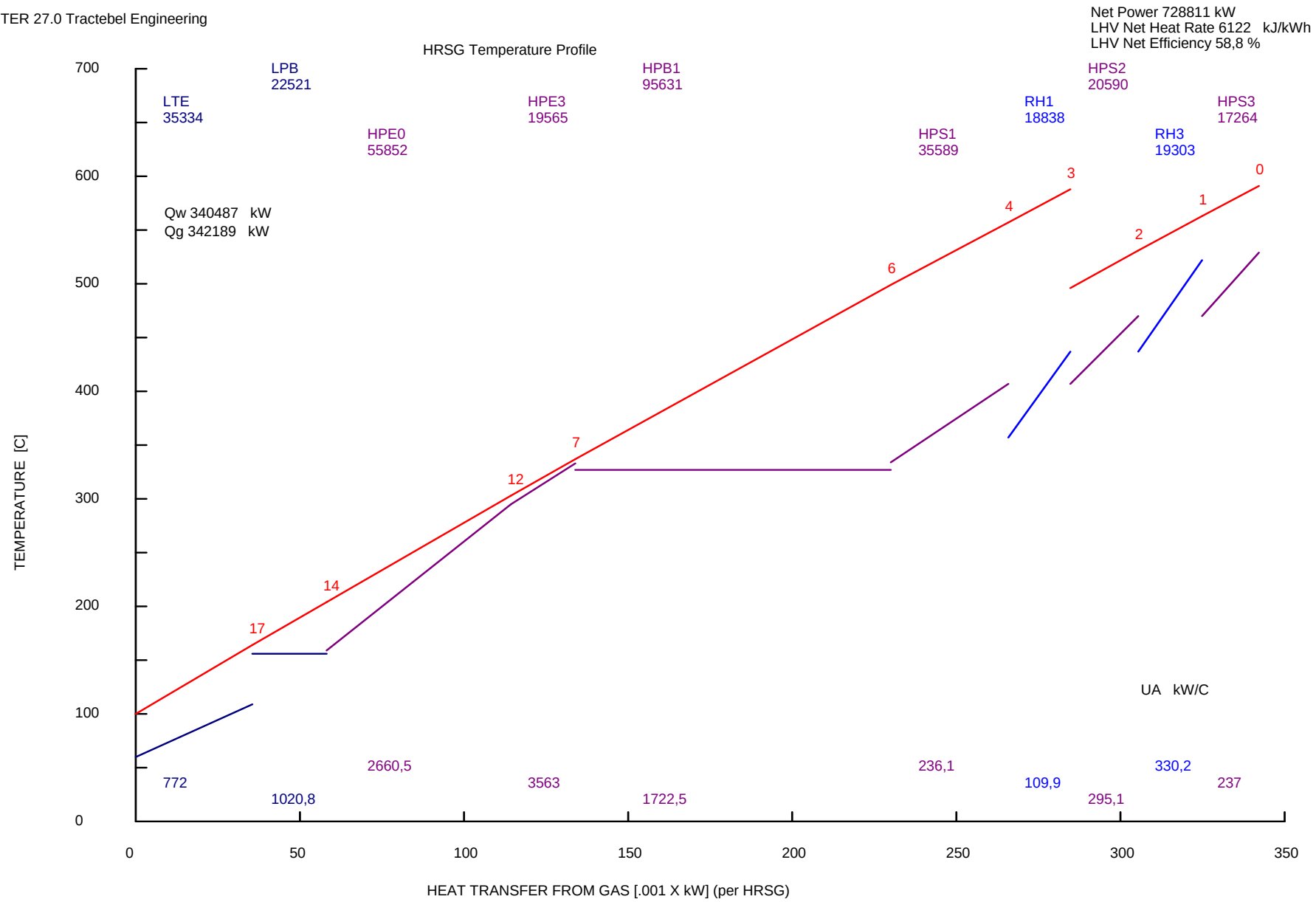




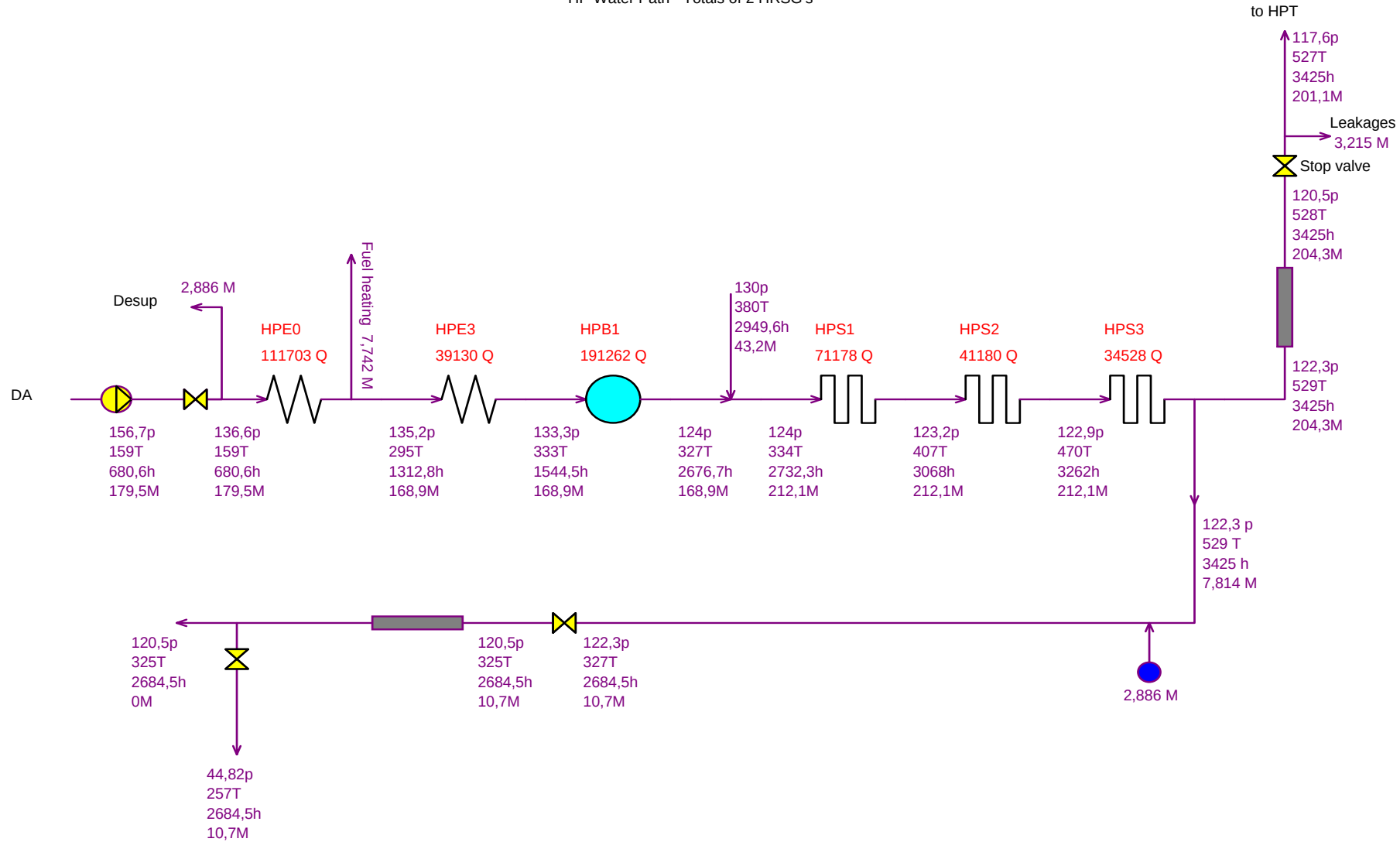




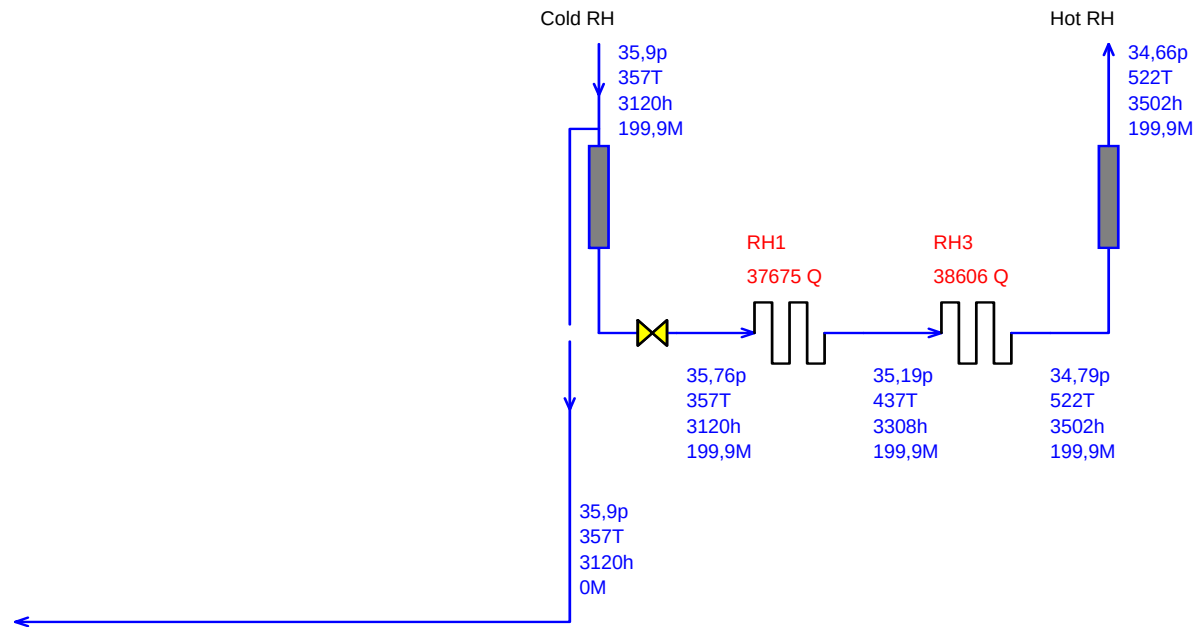




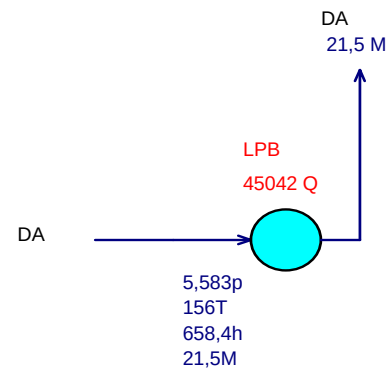
HP Water Path - Totals of 2 HRSG's



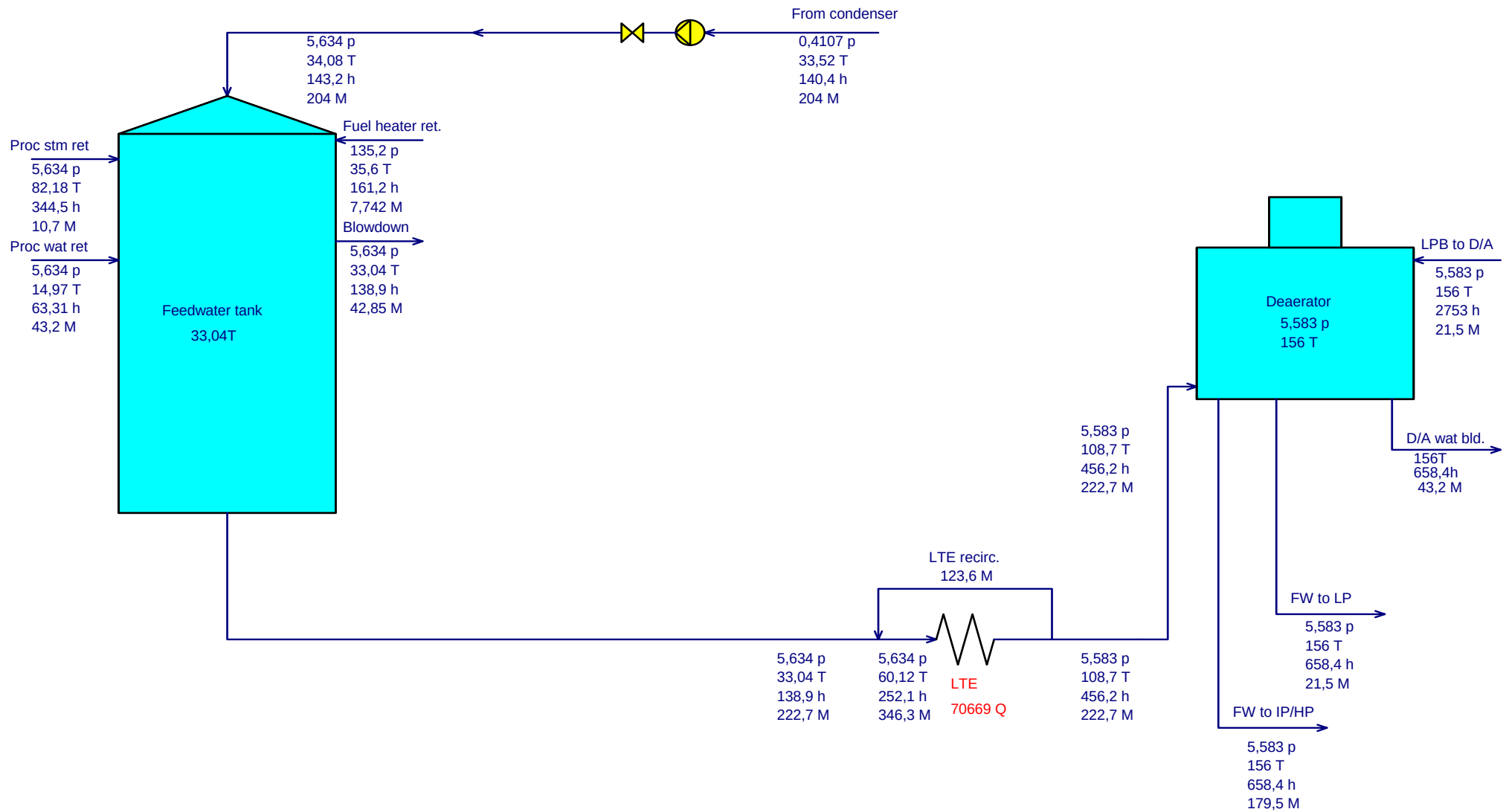
IP & Reheat Water Path - Totals of 2 HRSG's



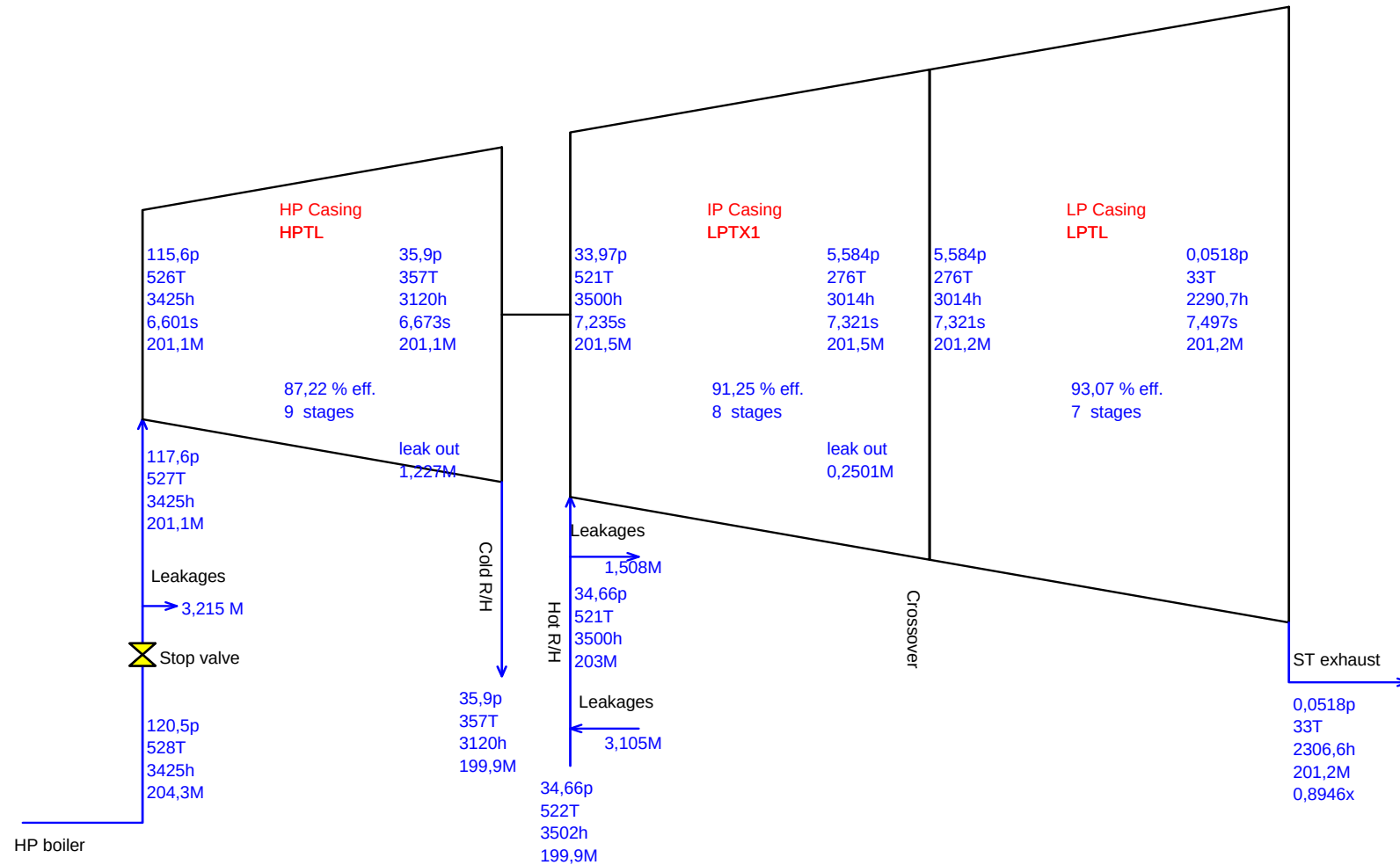
LP Water Path - Totals of 2 HRSG's

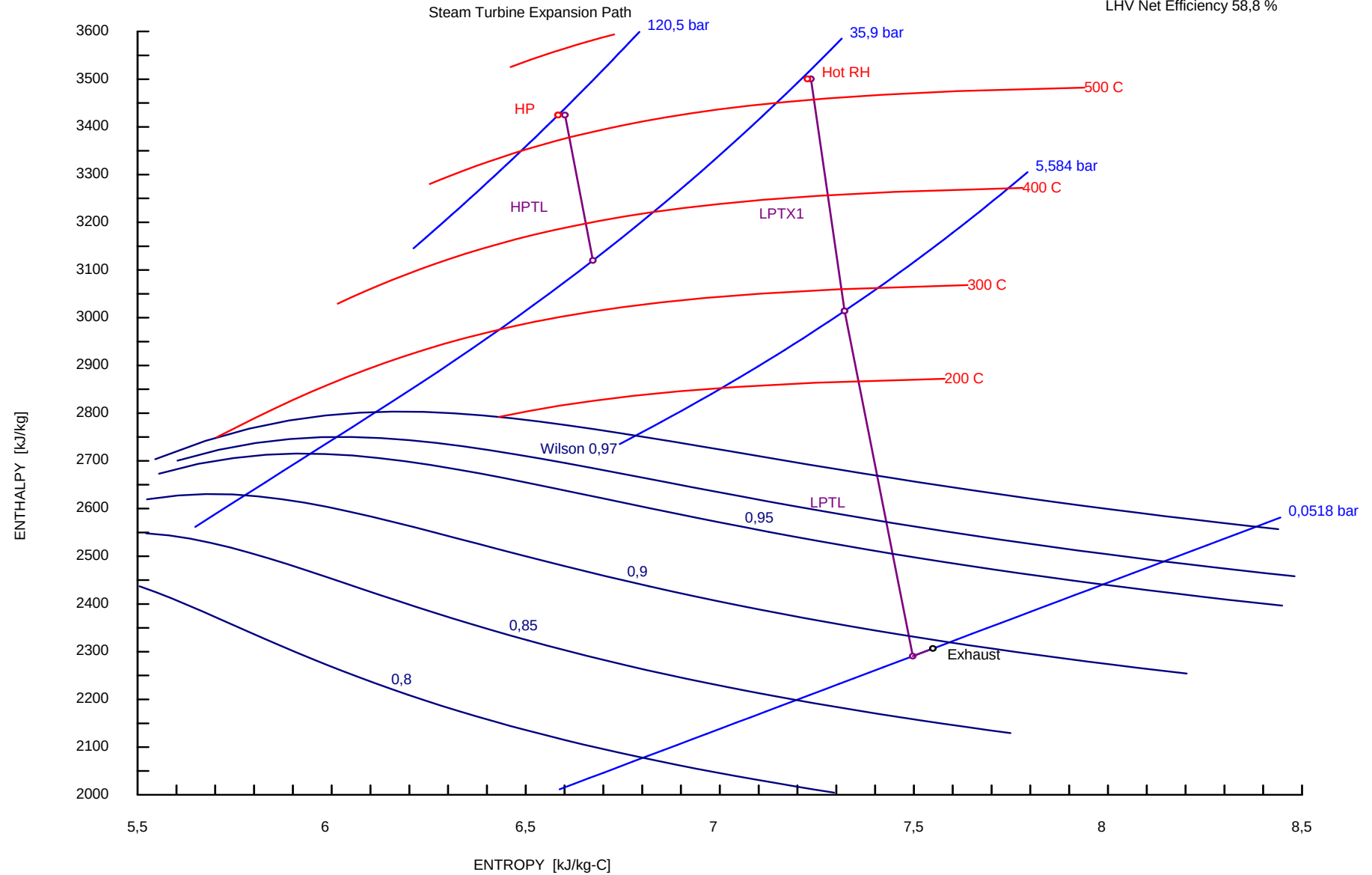


Feedwater Path - Totals of 2 HRSG's

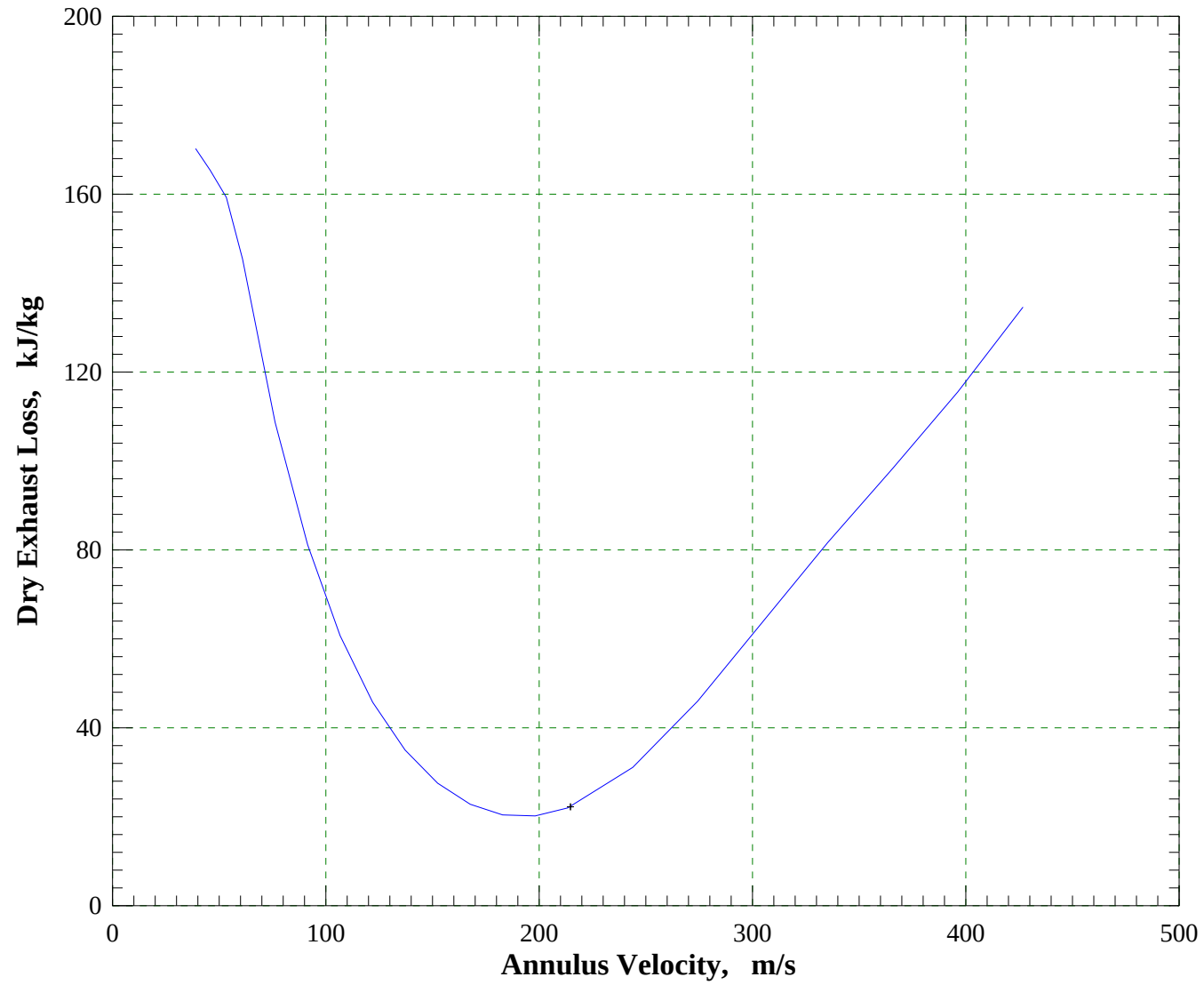


Steam Turbine Group Data

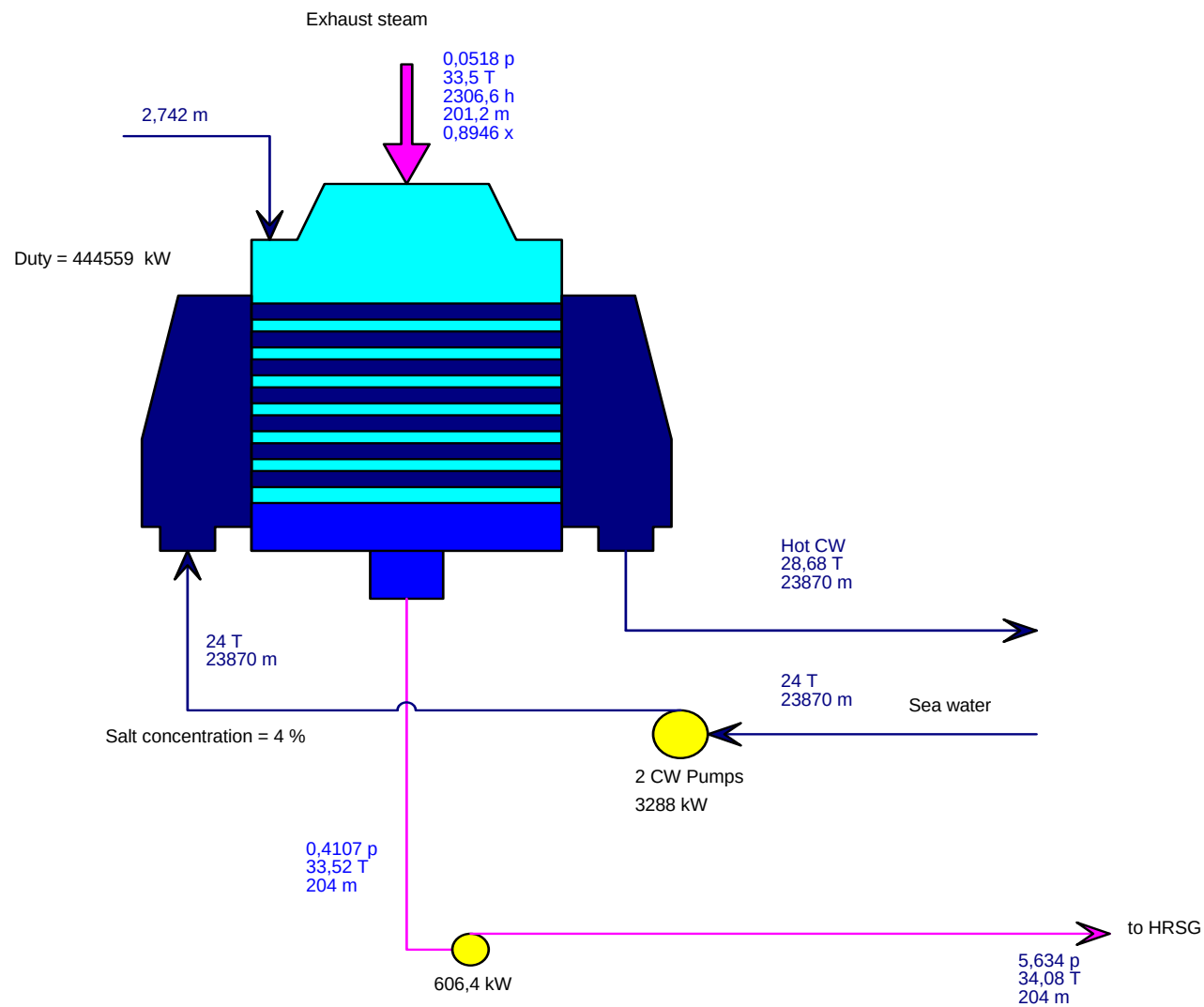


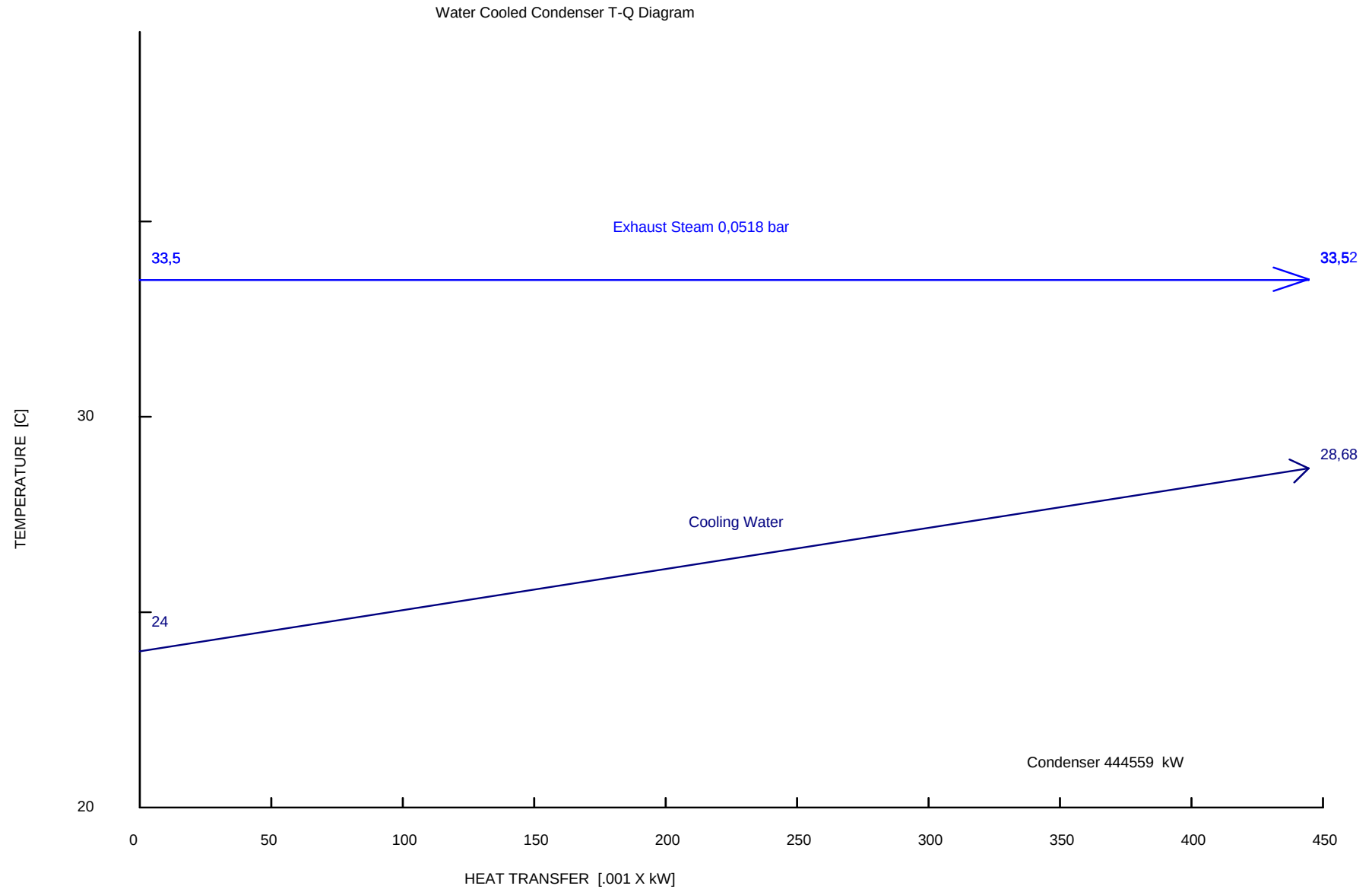


Steam Turbine Exhaust Loss



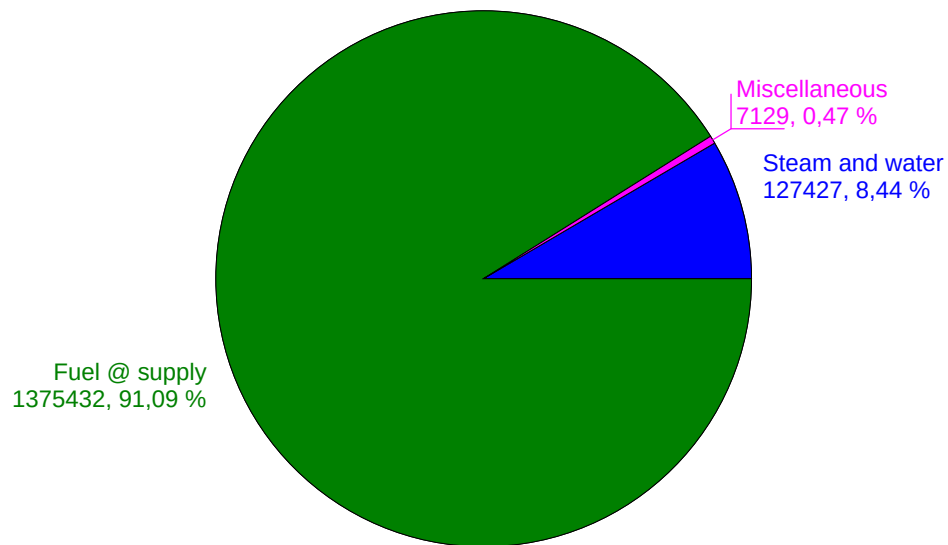
Cooling System





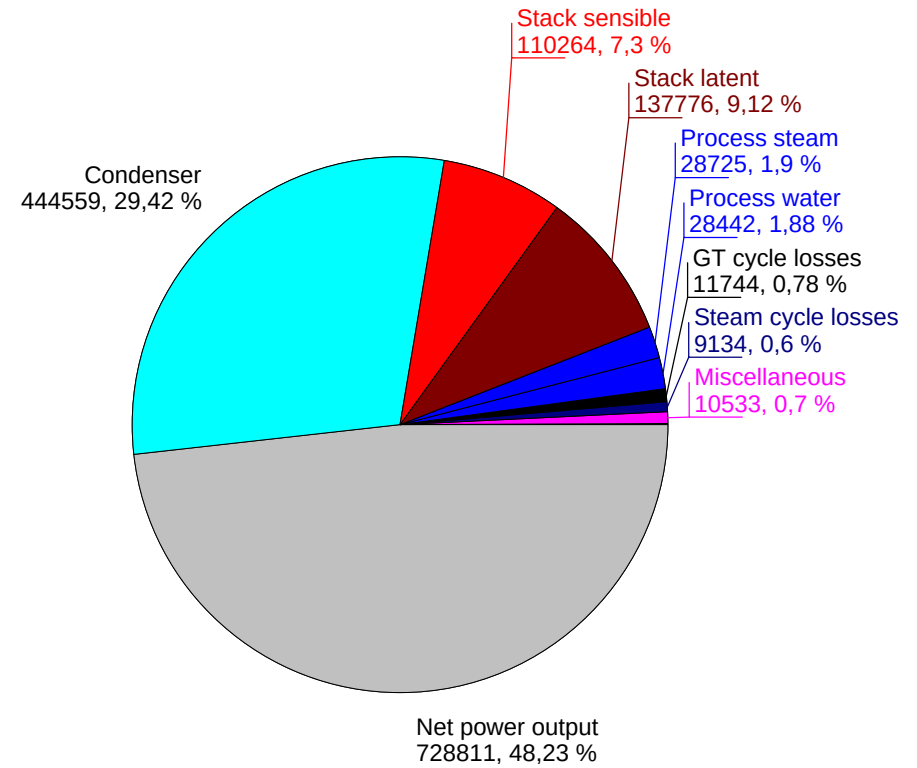
Plant Energy In [kW]

Plant energy in = 1509987 kW
 Plant fuel chemical LHV input = 1239477 kW, HHV = 1370512 kW
 Plant net LHV elec. eff. = 58,8 % (100% * 728811 / 1239477), Net HHV elec. eff. = 53,18 %



Plant Energy Out [kW]

Plant energy out = 1511157 kW

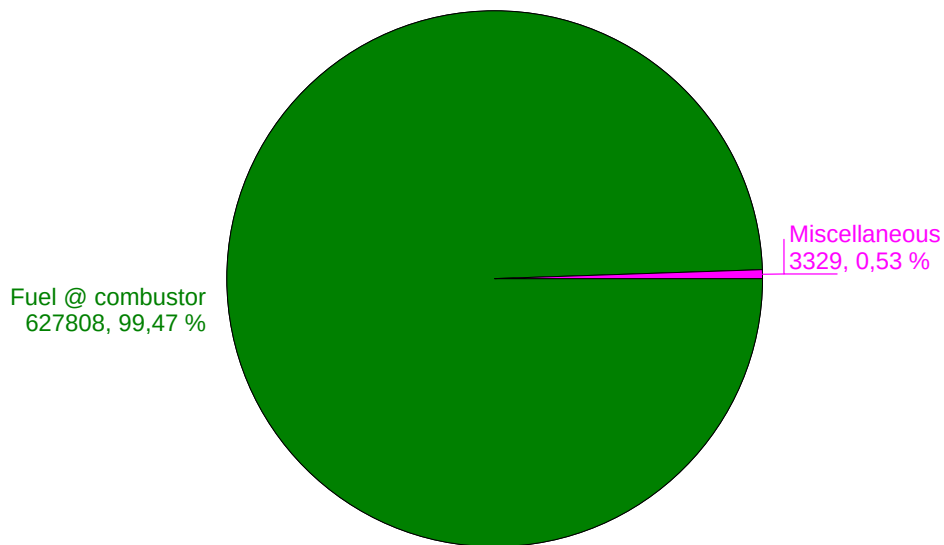


Zero enthalpy: dry gases & liquid water @ 32 F (273.15 K)

GT Cycle Energy In [kW] - per unit

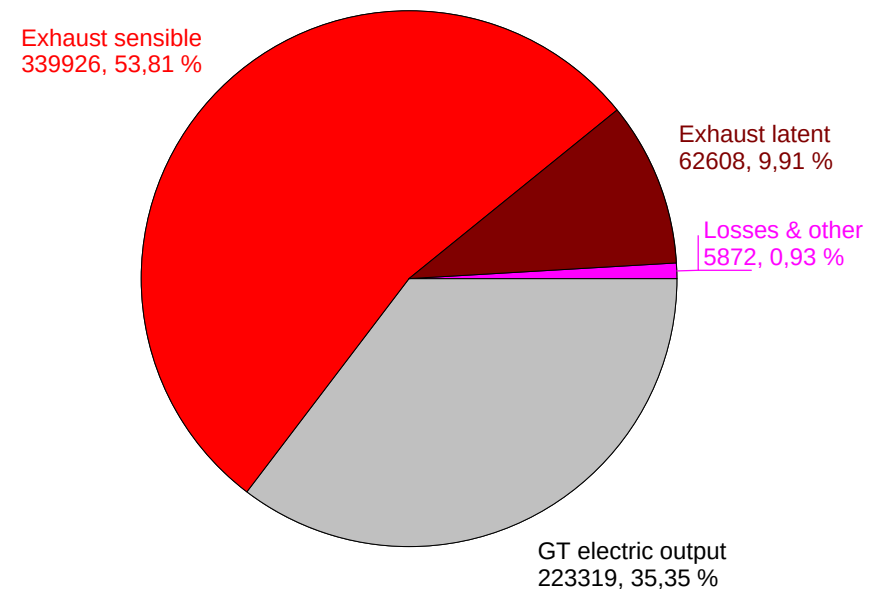
GT cycle energy in = 631137 kW

GT fuel chemical LHV input = 561735 kW, HHV = 621121 kW



GT Cycle Energy Out [kW] - per unit

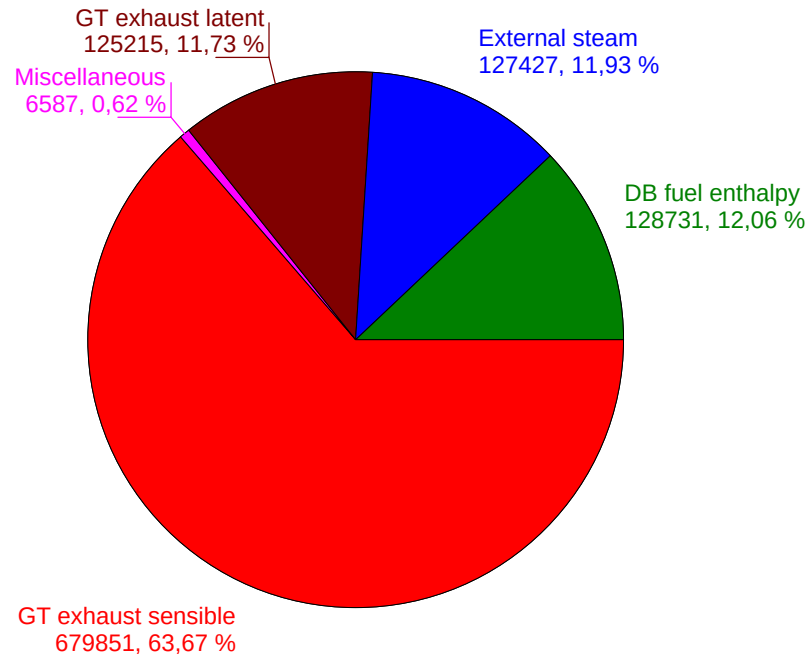
GT cycle energy out = 631724 kW



Zero enthalpy: dry gases & liquid water @ 32 F (273.15 K)

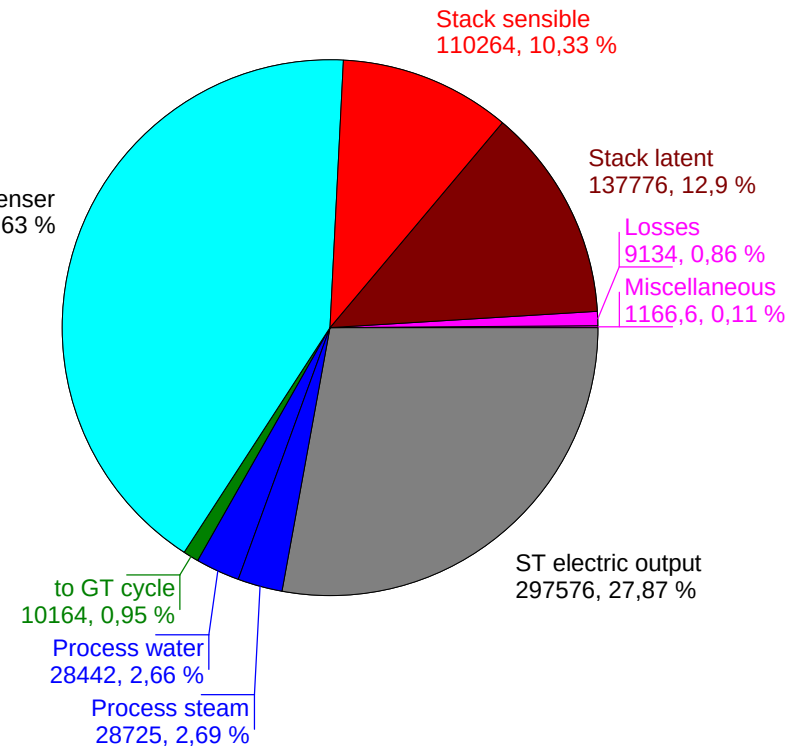
Steam Cycle Energy In [kW]

Steam cycle energy in = 1067810 kW



Steam Cycle Energy Out [kW]

Steam cycle energy out = 1067806 kW



Zero enthalpy: dry gases & liquid water @ 32 F (273.15 K)

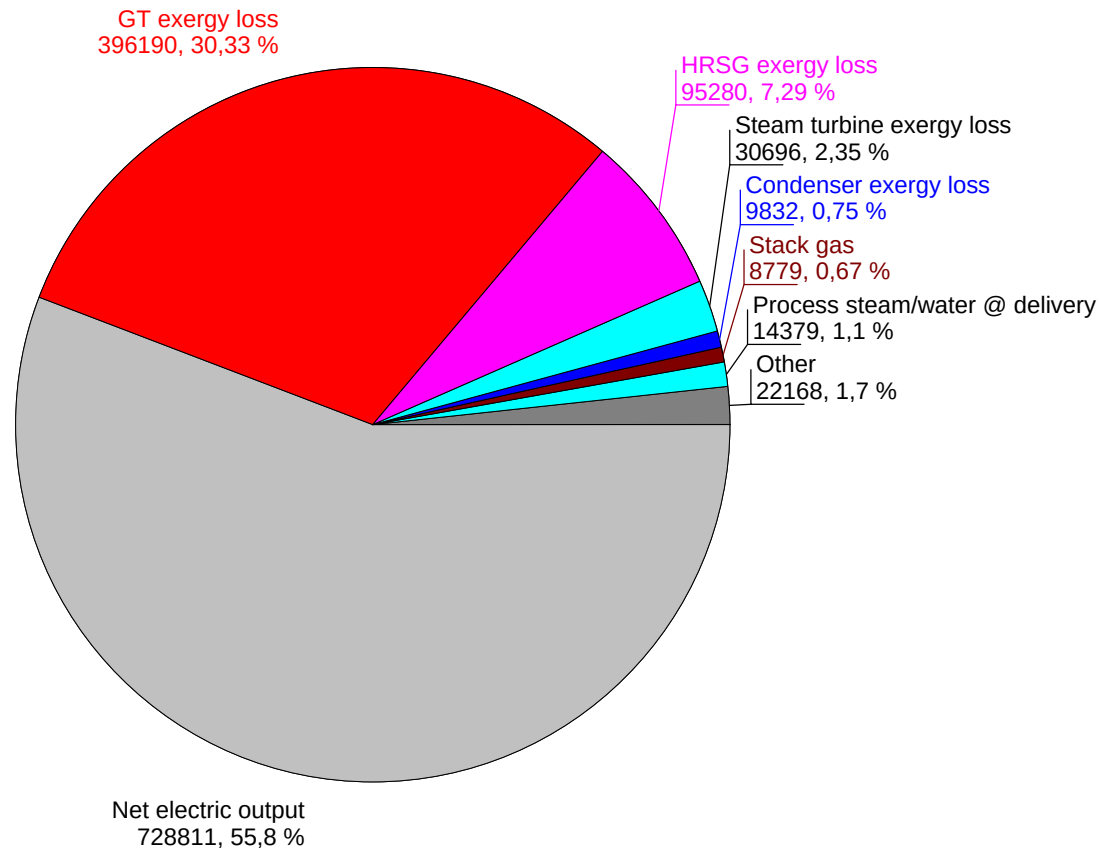


Plant Exergy Analysis [kW]

Plant exergy input = 1306134 kW

Fuel exergy input = 1253416 kW

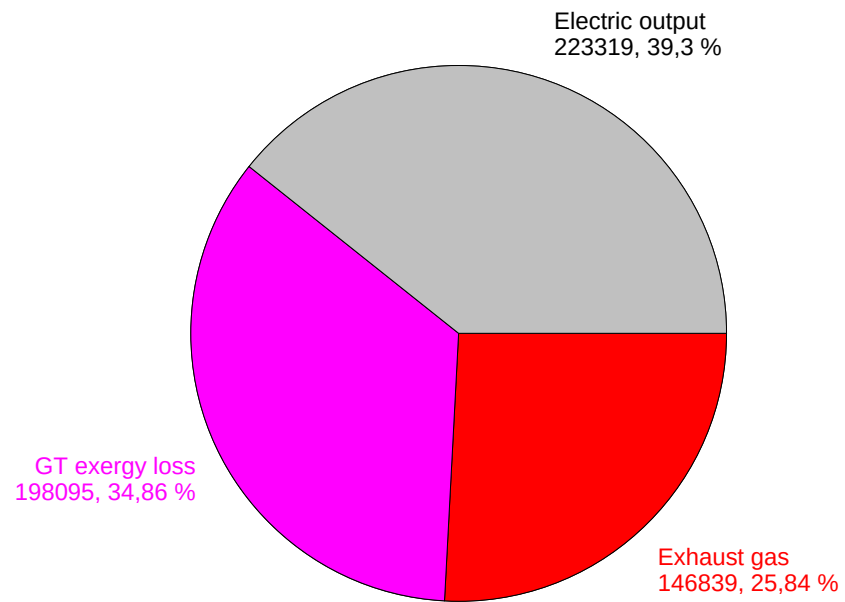
Plant fuel chemical LHV input = 1239477 kW, HHV = 1370512 kW



Reference: 1.013 bar, 25 C, water as vapor.

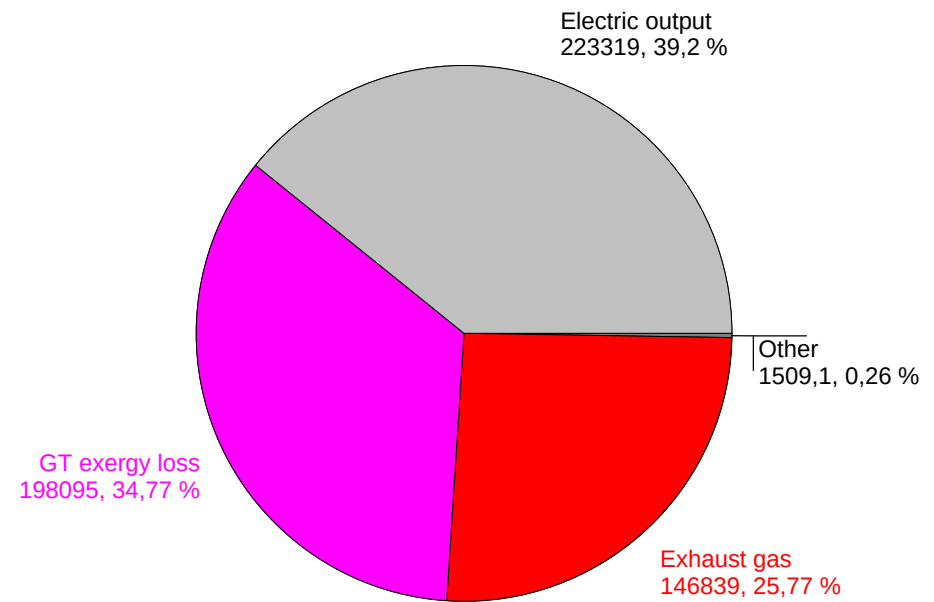
GT Exergy Analysis [kW]

GT exergy in = 568253 kW



GT & Peripheral Exergy Analysis [kW]

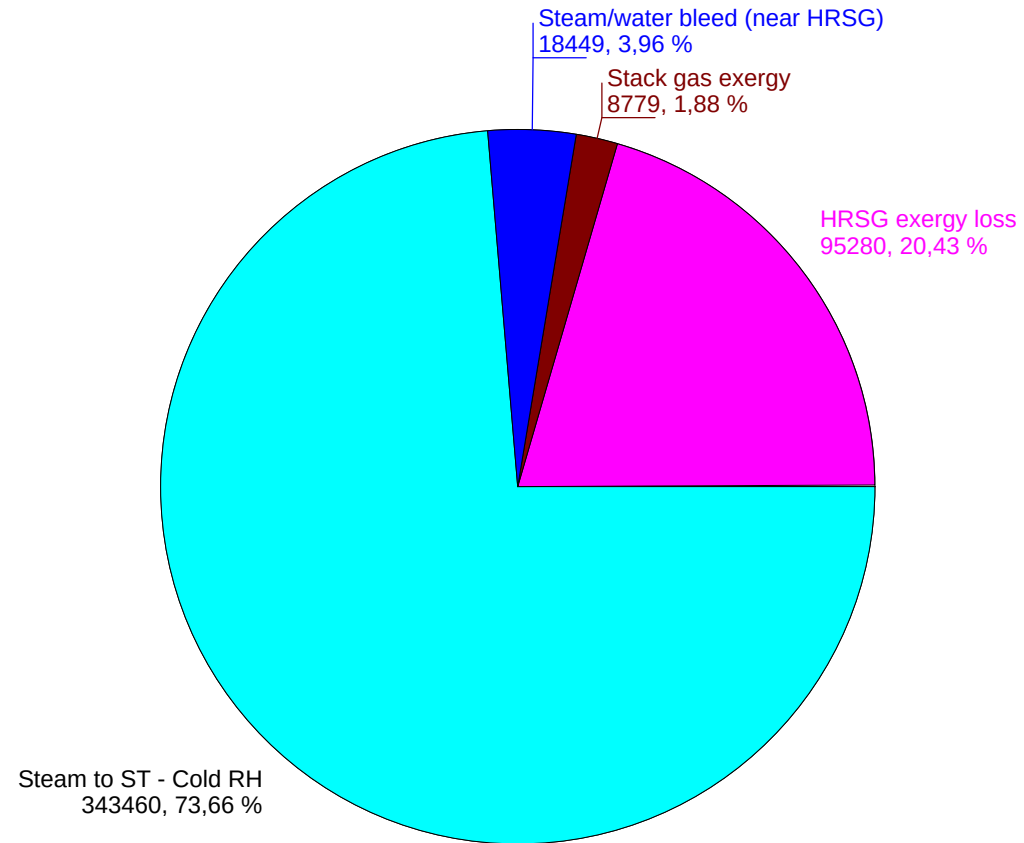
GT & peripheral exergy in = 569762 kW



Reference: 1.013 bar, 25 C, water as vapor.

HRSG Exergy Analysis [kW]

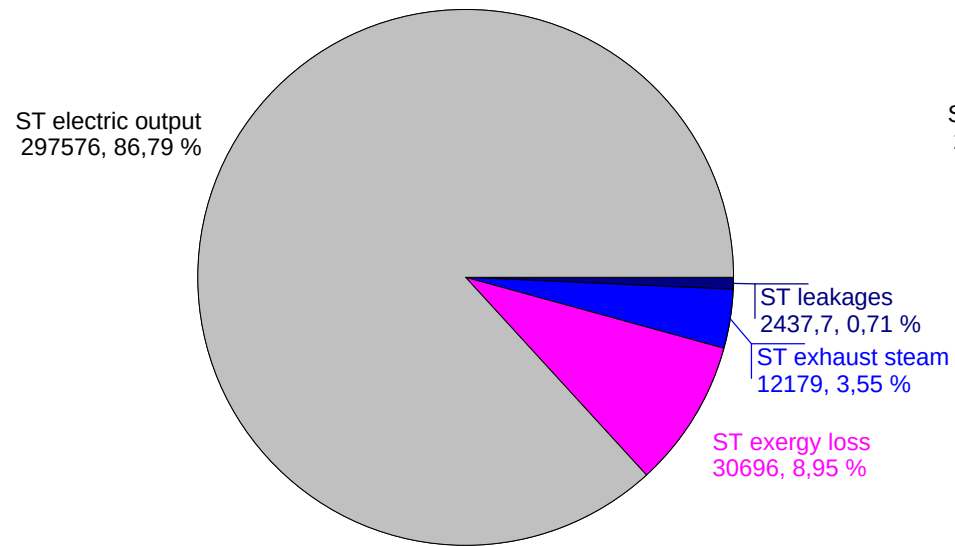
HRSG exergy in = 466292 kW



Reference: 1.013 bar, 25 C, water as vapor.

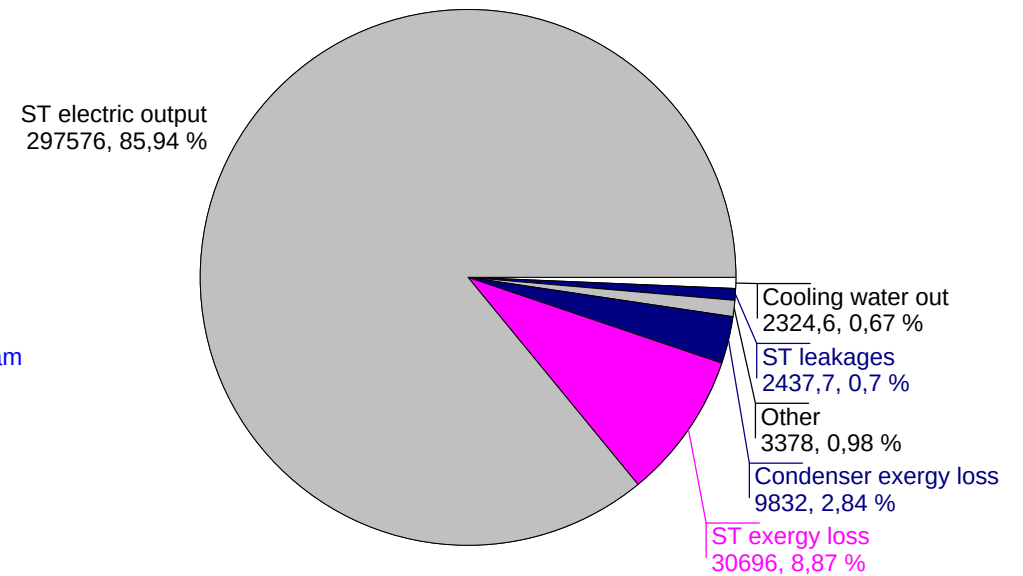
ST Exergy Analysis [kW]

ST exergy in = 342889 kW



ST & Condenser Exergy Analysis [kW]

ST & condenser exergy in = 346244 kW



Reference: 1.013 bar, 25 C, water as vapor.

