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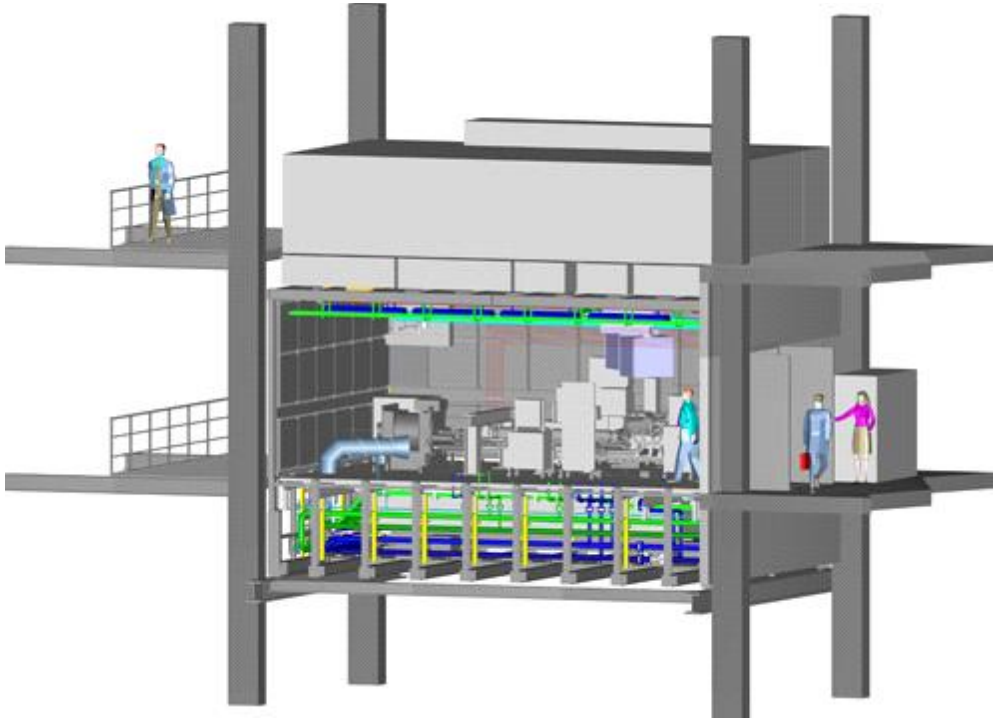
Structure

Solid Building?

Container?

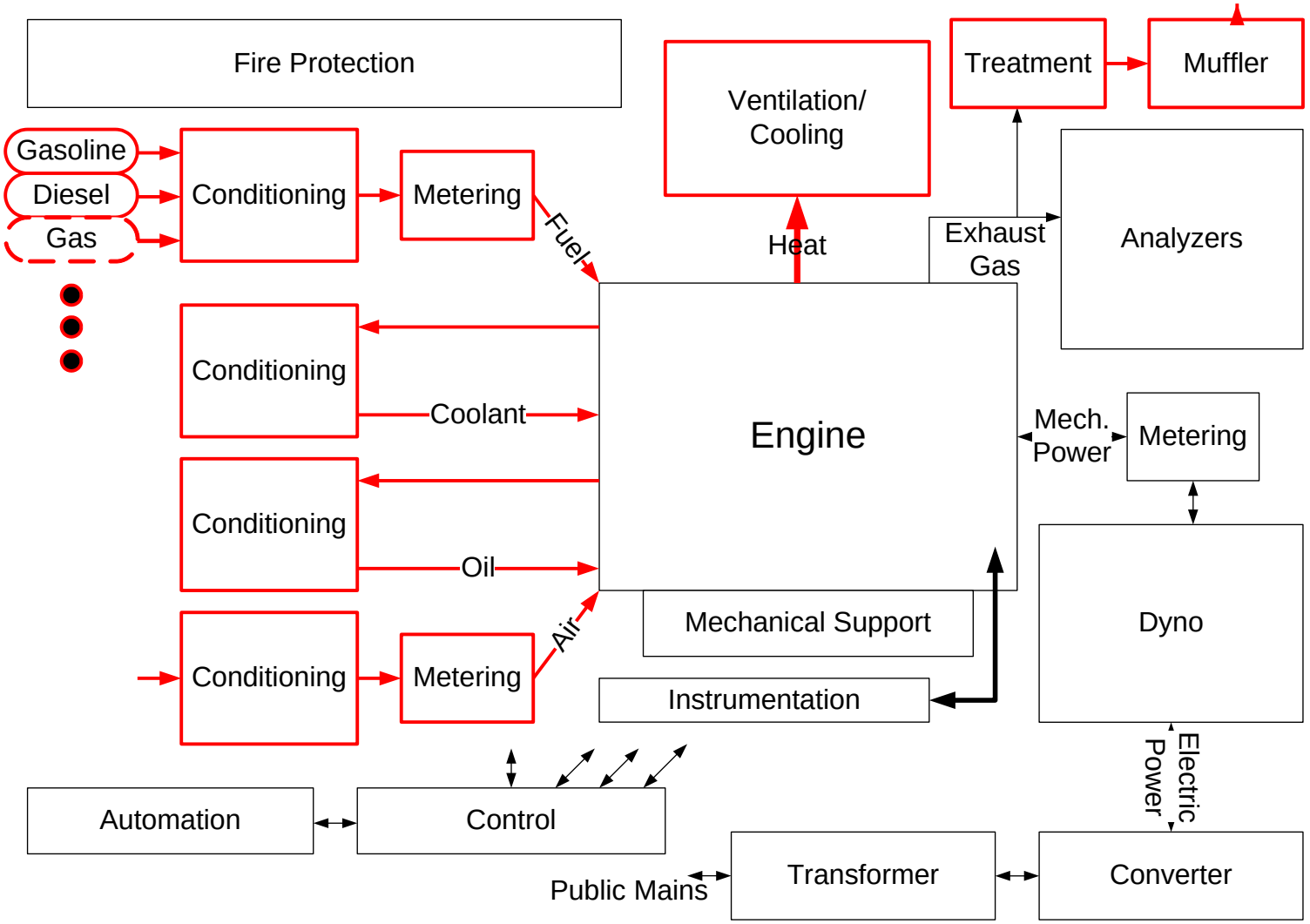
Structure

Combination



Source: Kühn Baupartner for BMW

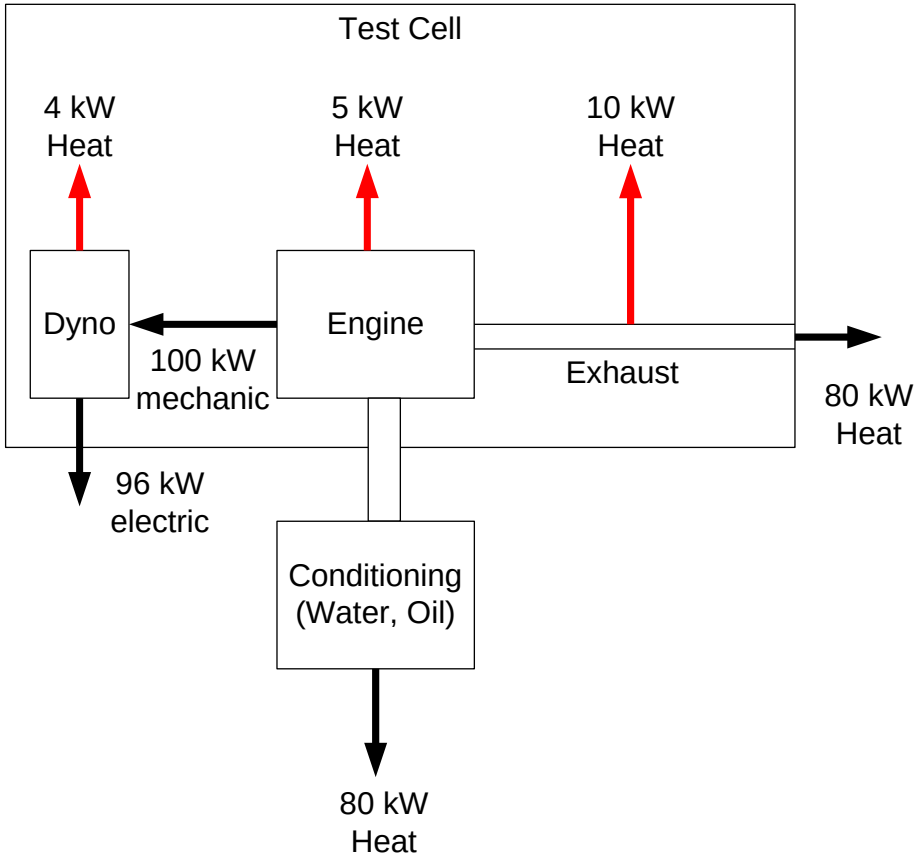
Overview



Fresh Air Supply

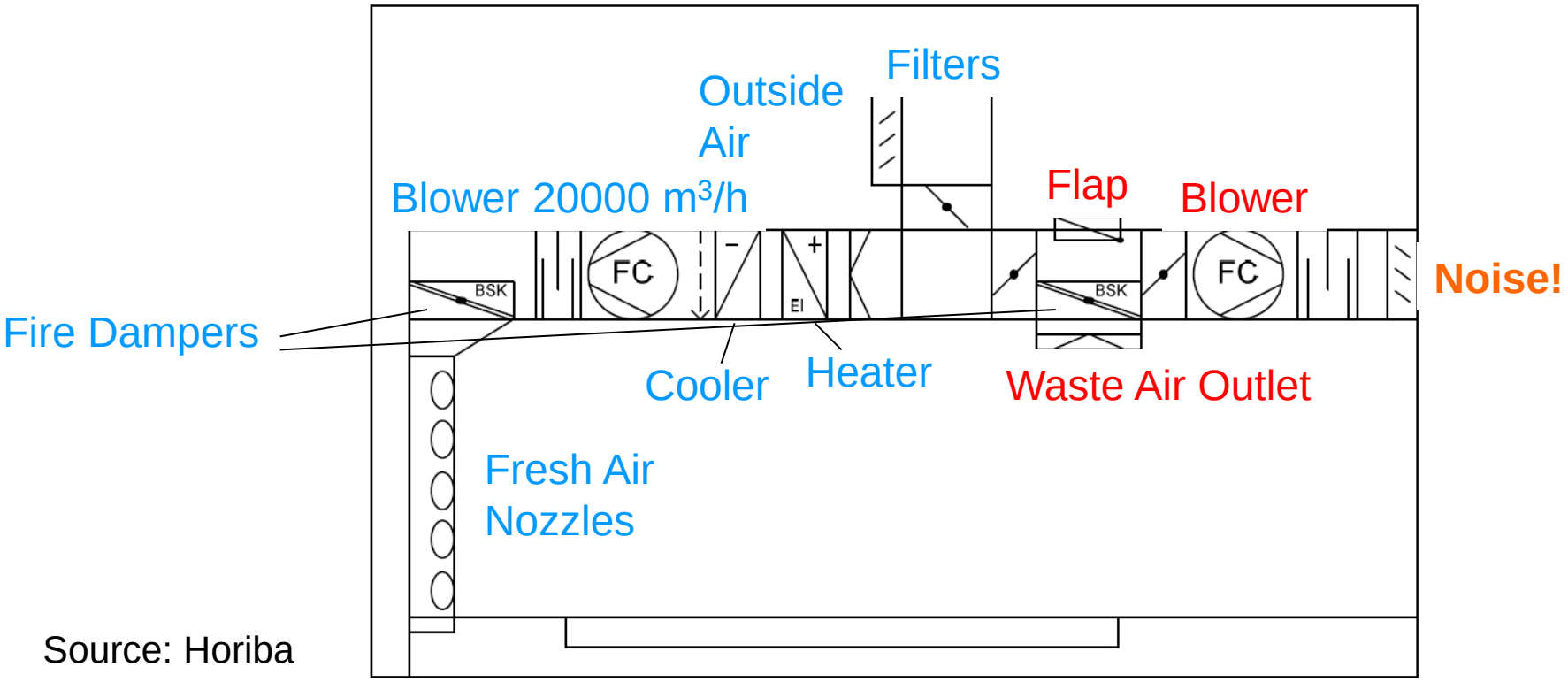
Engine needs fresh (and possibly conditioned) combustion air.

Engine and exhaust plant radiate heat power into small test cell.



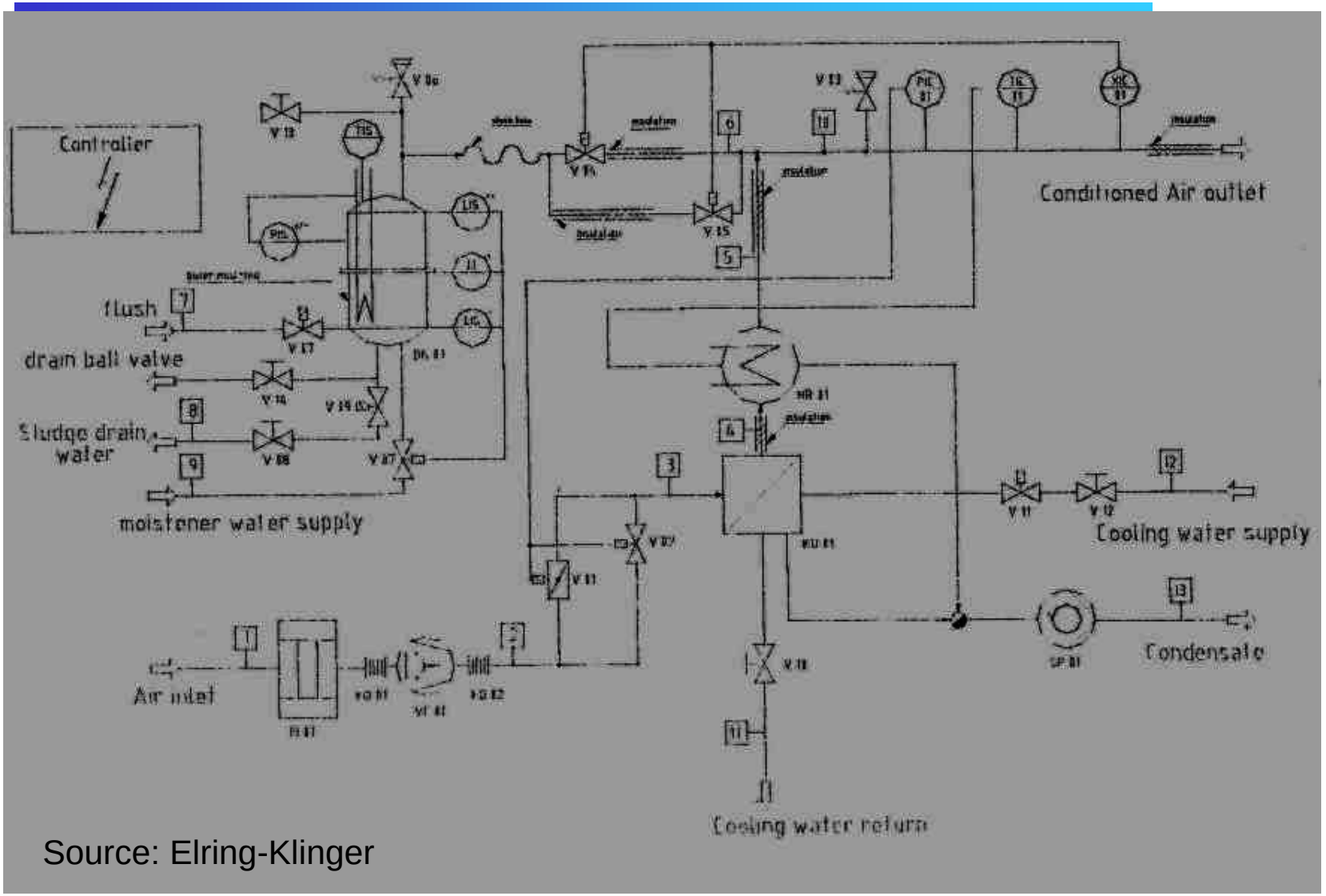
Example

Fresh Air Supply



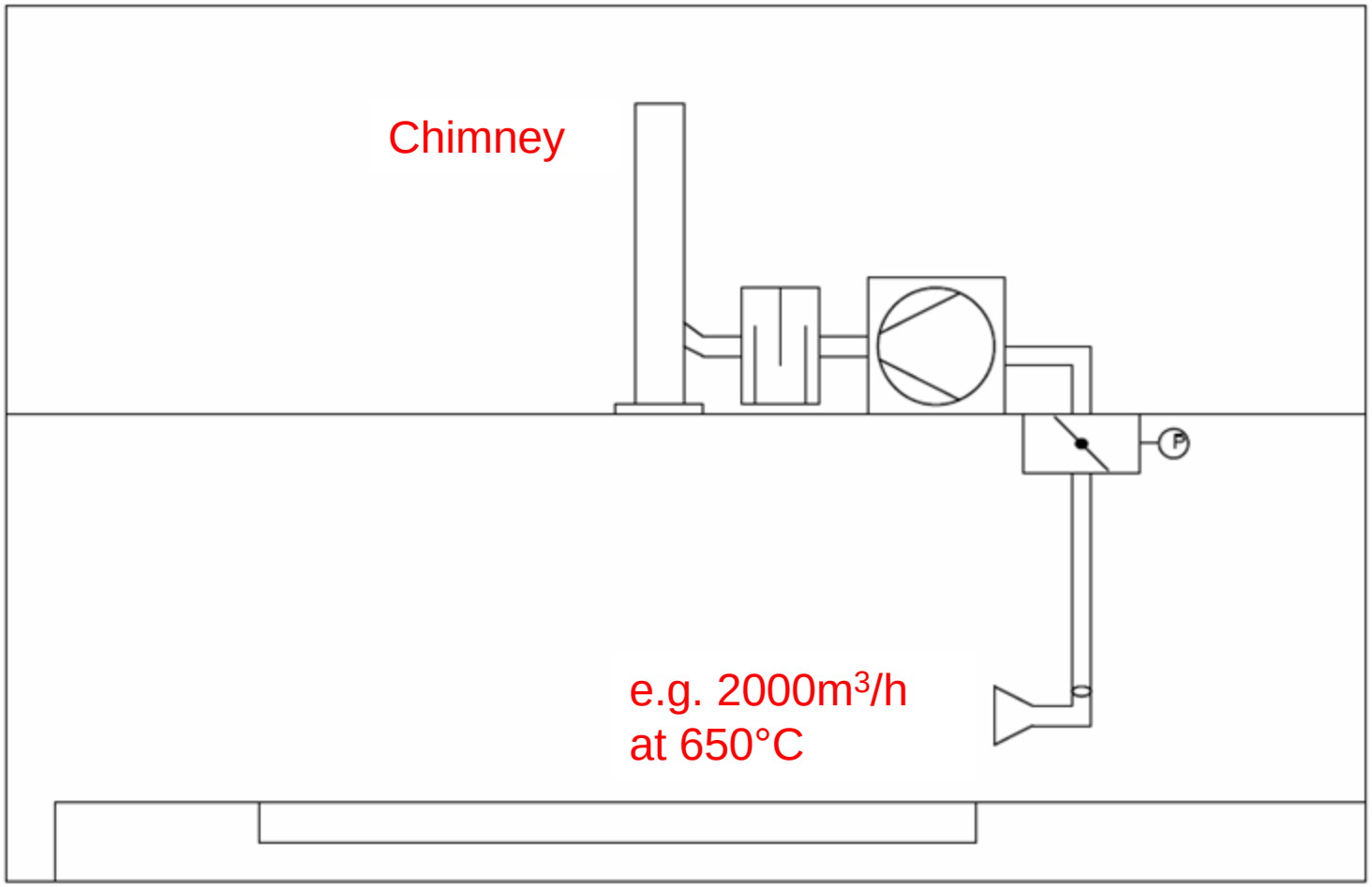
Source: Horiba

Complex Closed Loop ACU (Air Condition Unit)



Source: Elring-Klinger

Exhaust Gas



Source: Horiba

Exhaust Gas Volume Flow

Lower Density due to Temperature

Air Efficiency

2 Revolutions for 4 strokes

$$\dot{V} = \frac{\rho_{Air}}{\rho_{Exhaust}} \frac{p_1}{p_0} \lambda_a \left(0{,}79 + 0{,}21 \frac{m + n/2}{m + n/4} \right) \frac{n_0}{2} V_H$$

Volumetric Changes

m: Carbon, n: Hydrogen

Engine Displacement

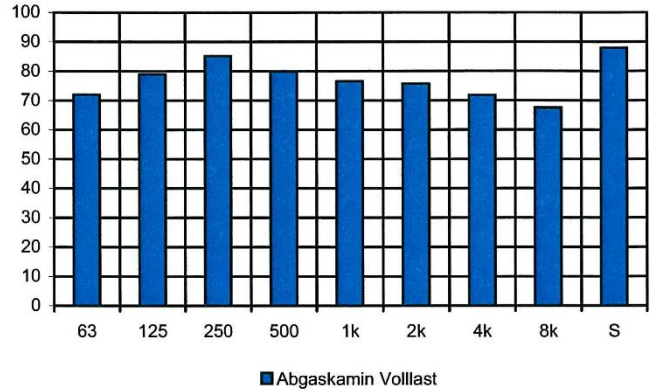
(Cylinder Displacement · Number of Cylinders)

Boost Pressure

Noise Emissions

Exhaust:

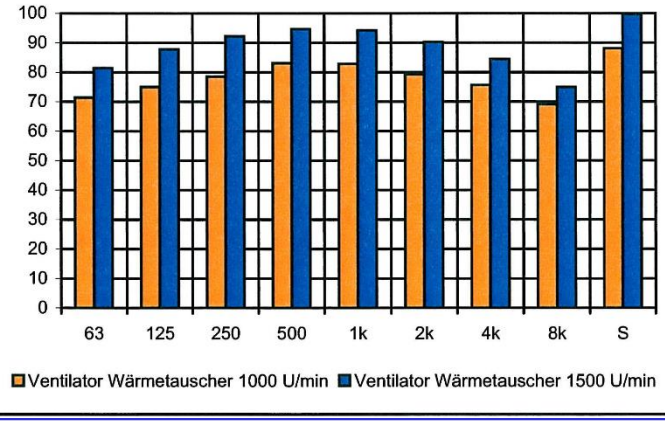
Meßgerät:	B&K 2144
Modus:	Terzanalyse
Filter:	1/1 Octave
Polarisation:	200 V
Mittelung:	Linear
Meßdatum:	19.01.2005
Uhrzeit:	10:00 Uhr - 11:00 Uhr
File Nr.	1/2
Bereich:	31,5 Hz - 8 kHz
Temperatur:	3 °C
Luftdruck:	1010 hPa
Rel. Feuchte:	90%
Overload:	No



Geräuschabstrahler, Lastfall	Schallleistungspegel [dB(A)] je Oktavmittenfrequenz [Hz]								
	63	125	250	500	1k	2k	4k	8k	Σ
Abgaskamin Volllast	72.0	79.0	85.2	79.9	76.6	75.7	71.8	67.6	88.0

Ventilation:

Meßgerät:	NC 10
Modus:	Terzanalyse
Filter:	1/1 Octave
Polarisation:	200 V
Mittelung:	Linear
Meßdatum:	16.02.2005
Uhrzeit:	15:30 Uhr - 16:30 Uhr
File Nr.	46/47
Bereich:	31,5 Hz - 8 kHz
Temperatur:	2 °C
Luftdruck:	1025 hPa
Rel. Feuchte:	45%
Overload:	No



Source: Fritz GmbH

Noise Emissions

	•Mode	•Level/ dB(A)
Threshold of Pain	*Comparison*	*> 120*
Leave Blower	*Comparison*	*ca. 100*
Ventilator Heat Exchanger	***Full Load***	***< 100***
Exhaust Chimney	***Full Load***	***< 90***
Air Outlet	***Full Load***	***< 80***
Truck	*Comparison, Normal Drive*	*< 85*
Outside Wall of Container Test Stand	***Full Load***	***< 85***
Air Inlet	***Full Load***	***< 70***
Vacuum Cleaner	*Comparison*	*< 70*

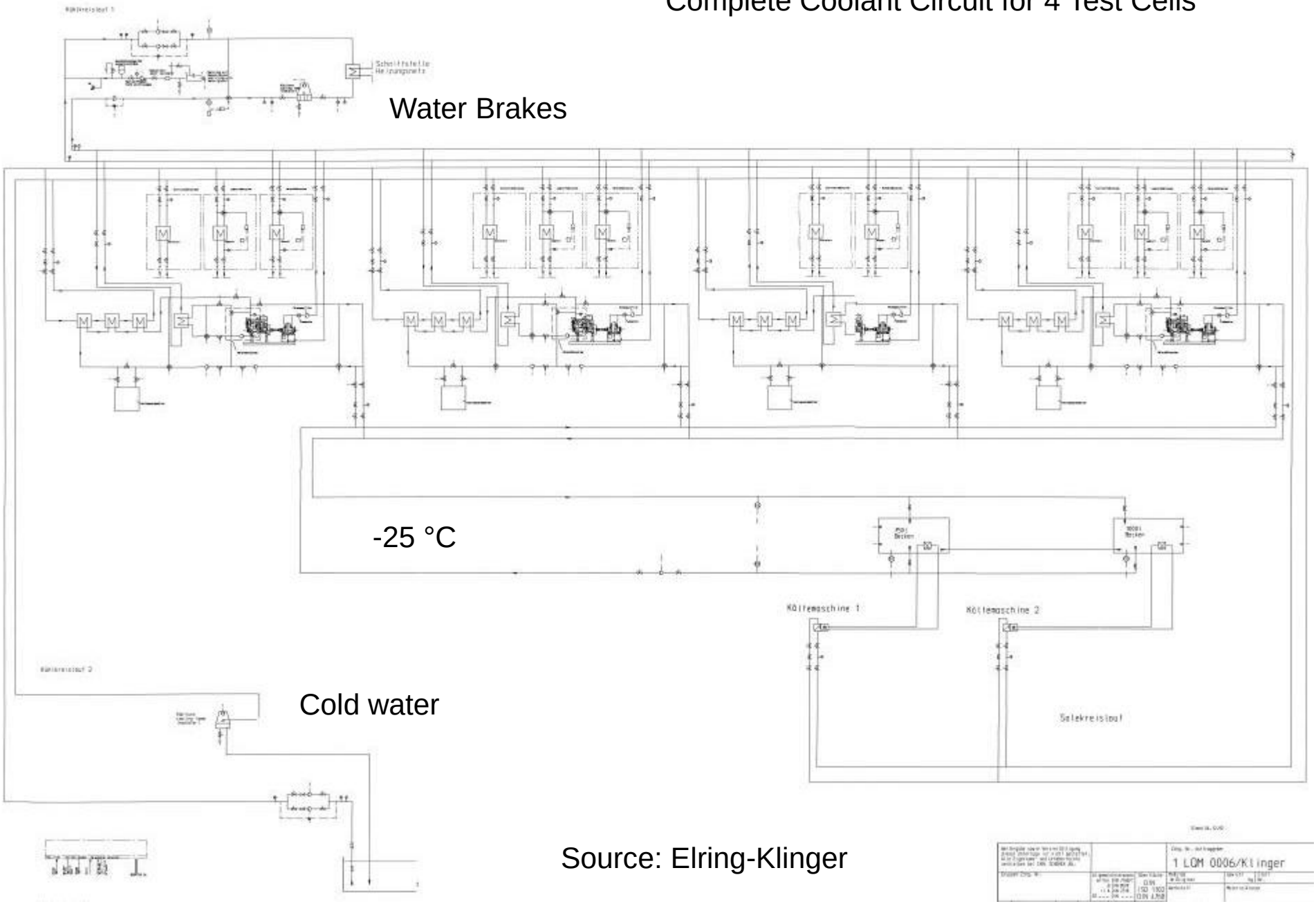
Water Conditioner

Cooling Towers

Closed Design
(in this case of building 6)

Open Design,
Source: Wikimedia Commons

Complete Coolant Circuit for 4 Test Cells



Source: Elring-Klinger

Fuel Storage

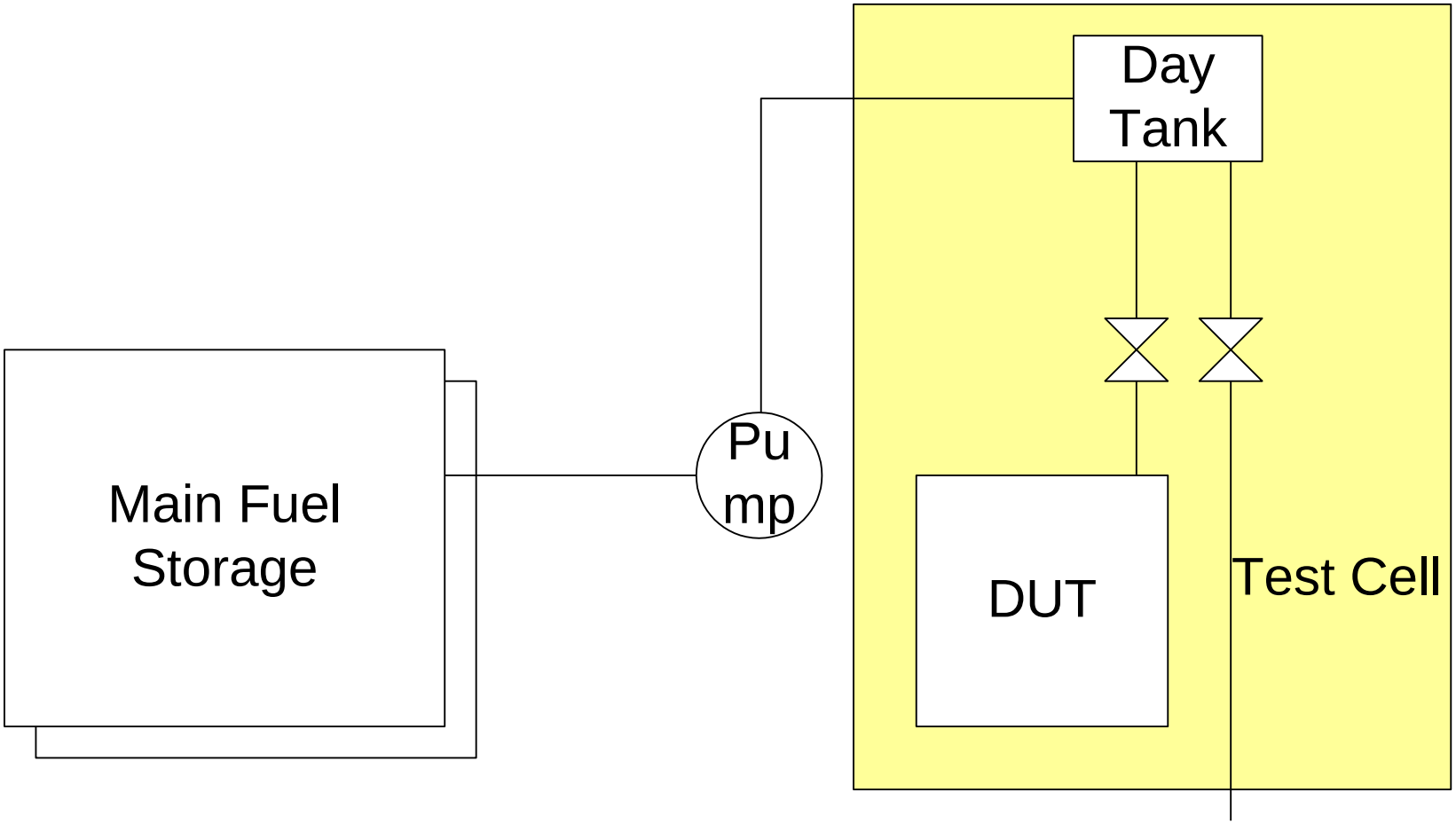
e. g.

- several Types of Diesel (or Heating Oil)
- Kerosene
- several Types of Gasoline
- Biofuels and synthetic fuels

- LPG (Liquefied Petrol gas)
- CNG (Compressed Natural Gas)
  can be taken from public supply
- Hydrogen

Fuel Storage

Day Tank System



Fuel Conditioner

Oil Conditioner

Portable Oil Conditioner

Source: AVL