

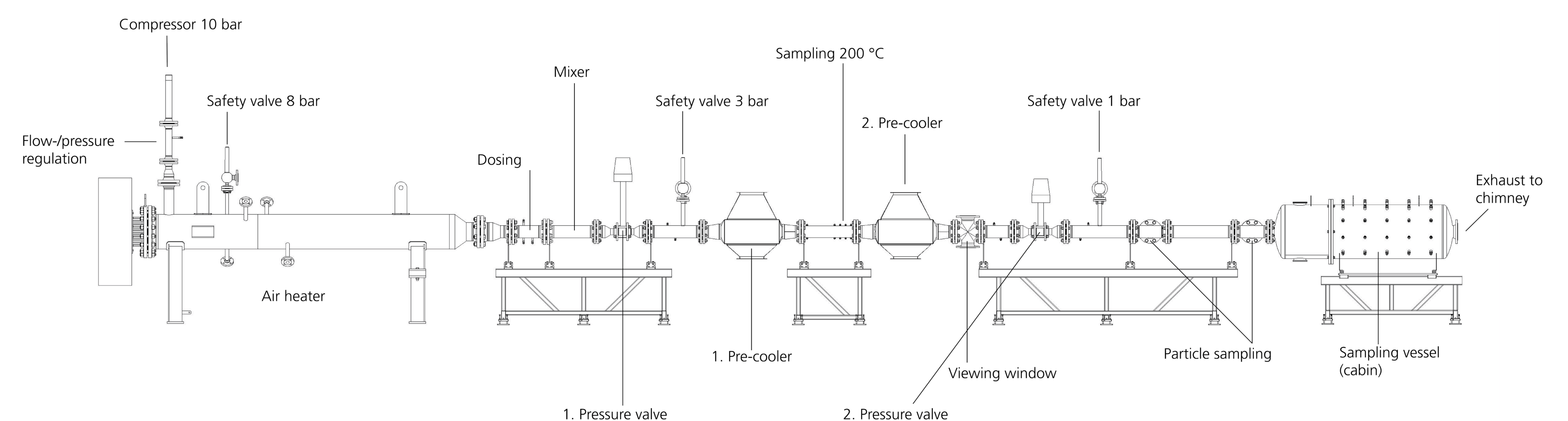
# Bleed Air Contamination Simulator BACS

Bleed Air is the fresh air taken from the aircraft engine and then mixed with cabin recirculation air usually at a 50 to 50 ratio to supply air to the passengers in the aircraft cabin. Under unfavorable conditions and in very rare cases, operating fluids such as engine oil, hydraulic oil or de-icing fluid may enter the bleed air supply for the cabin.

Such failure cases are simulated and investigated at our Bleed Air Contamination Simulator BACS.

## Functionality of BACS

Ambient air at a pressure of about 1 bar and a temperature of about 20 °C is sucked in by a compressor and compressed to 10 bar pressure. The air heater heats the air to temperatures up to 590 °C. Into this hot and up to 8 bar compressed air possible bleed air contaminants such as engine oil, hydraulic oil or de-icing fluid are dosed in at different concentration levels. After the air-oil-mixture has flown through a mixer, it is decompressed to 3 bar and cooled down in a first heat exchanger. Here at e. g. 200 °C a first air sample may be drawn.



After that, the air stream is further cooled down in a second heat exchanger and then decompressed from 3 bar to ambient pressure of about 1 bar. From here on the air stream has room temperature. In this area, particle samples may be drawn. The 300 L vessel afterwards simulates the aircraft cabin. 40 sampling points at the vessel allow drawing of air samples for online analysis (CO, CO<sub>2</sub>, NO<sub>x</sub>, O<sub>3</sub>, TVOC) and for laboratory investigations (VOCs, aldehydes, ketones, organic acids, organophosphates).

## Summary of the technical specifications

- Air flow: 170 to 230 m<sup>3</sup>/h
- Temperature: 25 °C to 590 °C
- Pressure: 1 to 8 bar
- Defined contamination with e. g. engine oil, hydraulic oil, de-icing fluid
- Detailed characterization of degradation products
- Investigation of air purification devices (filters, converters)
- Investigation of air quality sensors

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