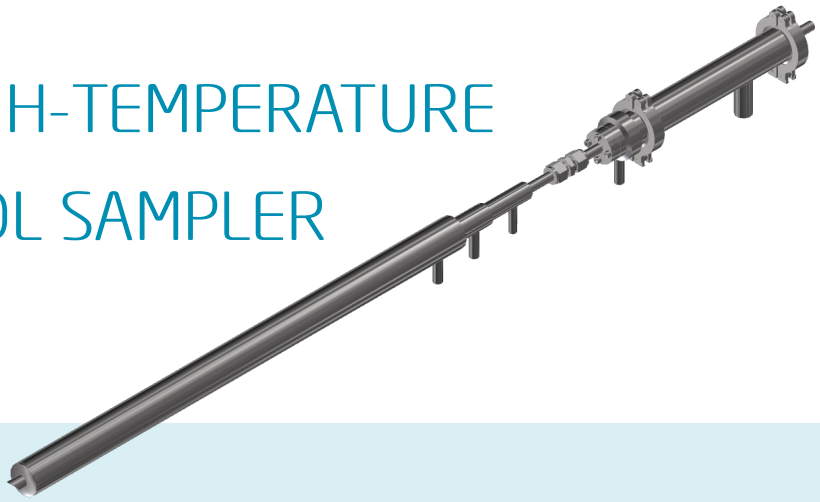
VENACONTRA HIGH-TEMPERATURE DILUTING AEROSOL SAMPLER (V-HDAS)



V-HDAS

Venacontra High-temperature Diluting Aerosol Sampler (V-HDAS) is developed specifically for aerosol sampling from high temperature process gases. High temperature processes can be very challenging for aerosol measurements due to their typically high concentrations of condensable vapours and high temperature gradients. VC-HDAS is designed to quench chemical reactions and aerosol transformation processes rapidly inside the sampling probe with a special diluting probe tip developed by Venacontra, thus minimising potential sampling artefacts.

The system combines porous tube and ejector type dilution technologies providing a controlled two-stage dilution and cooling process. This enables measurements from high temperatures with aerosol analysis instruments that require operation at ambient temperatures and pressures.

Applications

- High-temperature process gases and emissions
- Locations that are difficult to reach
- Sampling from nanoparticle synthesis reactors
- Direct aerosol sampling from combustion chambers

Features and Benefits

- High-temperature sampling up to 1000°C
- Inbuilt porous tube diluter in the sampling probe
- Compact design (outer diameter of the sampling probe is only 43 mm)
- Non-blockable ejector nozzle

System

Ⓐ ***Venacontra High-temperature Sampling Probe*** with inbuilt porous tube diluter for aerosol sampling and the first dilution stage.

Ⓑ ***Venacontra Ejector Diluter (VC-ED)*** for the second dilution stage.

- High quality mass flow controller (0-50 lpm) for controlling diluting gas stream in the porous tube diluter.
- High quality mass flow controller (0-250 lpm) for controlling diluting gas stream in the ejector diluter.
- Straight tube fitting for connection of the two diluters, tubes for diluting gases and two straight fittings to connect diluting gas tubes into the diluters.

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DILUTING is often one of the most crucial parts of the aerosol sampling and measurement systems. For most aerosol measurement setups, the target of the aerosol dilution system is to dilute and cool the sample suitable for the used analysers and to preserve the sample as unbiased as possible. In high temperature sampling, it is crucial to quench chemical reactions and aerosol dynamics to obtain reliable information from process gases at the sampling point.

THE VENACONTRA DILUTING SAMPLING SYSTEMS are designed to achieve these goals. They provide stable and adjustable flow rates and a well-conditioned dilution and mixing process, which is essential in having desired sampling conditions with minimal sampling artefacts.

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Reliable sampling

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Operation

1 The V-HDAS sampling probe is installed in a stack, or in a furnace/reactor, to draw an (high temperature) aerosol sample to the inlet tip for the first dilution stage that takes place in an inbuilt porous tube diluter. Distance between the inlet tip and the porous tube diluter is minimal to avoid sample losses.

2 The first dilution takes place in the porous tube diluter in which dilution gas (usually air or N_2 1-40 lpm) is supplied through a porous wall and mixed with the sample. Dilution ratio can be varied from 1 to 40.

3 The porous tube diluter and the sampling line are actively cooled with fluid circulation (see 5 and 6). This allows temperature controlled transportation of the sample (from the porous tube diluter) to the second dilution (see 7) even in high temperature applications. The coolant flows within co-centric tubes covering the V-HDAS probe all the way until the inlet tip (1).

4 Dilution gas for the porous tube diluter is fed through 10 mm inlet and transported to the porous tube diluter in an annular space between sample flow tube and ingoing cooling fluid tube.

5 Cooling fluid (usually water or air) is fed through 12 mm inlet. The usage of cooling liquid (e.g. water) efficiently keeps the V-HDAS probe cooled.

6 Cooling fluid outlet (12mm outer diameter).

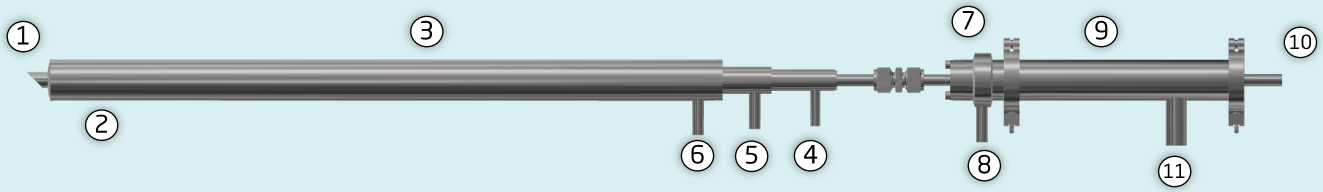
7 Second-step dilution takes place in the ejector dilutor with dilution ratio of 4.

8 Dilution gas for the ejector diluter is fed through a 12 mm inlet.

9 Dilution gas and sample is mixed well in the mixing chamber.

10 Diluted sample is drawn out from a 12 mm outlet for measurement devices. (Optional multioutlet).

11 An additional exhaust outlet of 22 mm is used for excess sample.



Specification

Venacontra High-temperature Sampling Probe

Material	
Outer body and inlet	Stainless steel 253MA (1.4835)
Other body and parts	Stainless steel 316L (1.4404)
Inlet	
Sample	12 mm (45 angle)
Dilution gas	12 mm
Cooling liquid	14 mm
Outlet	
Sample	12 mm
Cooling liquid	12 mm
Maximum temperature	1000°C
Flows	(when used with VC-ED)
Sample inlet	1-5
Dilution gas inlet	18-50
Sample outlet	23-51
Dilution ratio	5-51
Dimensios	
Length	867 mm
Max. Diameter	42 mm
Weight	4.5 kg

Venacontra Ejector Diluter (VC-ED)

Material	
Body	Stainless steel 316L (1.4404)
Seal	Copper
Clamps	Stainless steel
Clamp seals	Viton
Inlet	
Sample	12 mm
Dilution gas	12 mm
Outlet	
Sample	12 mm
Exhaust	22 mm
Maximum temperature	180°C
Flows	
Sample inlet	23-67 lpm
Dilution gas inlet	70-200 lpm
Sample outlet	93-267 lpm
Dilution ratio	4
Dimensios	
Length	320 mm
Max. Width	110 mm
Weight	2.1 kg

Venacontra is a Finnish company in the field of aerosol technology. We provide diluting aerosol sampling systems for various aerosol environments. We have decades of expertise in combustion processes, nanomaterial synthesis and aerosol sampling systems. We provide customised solutions and expertise for designing your sampling set-ups.

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