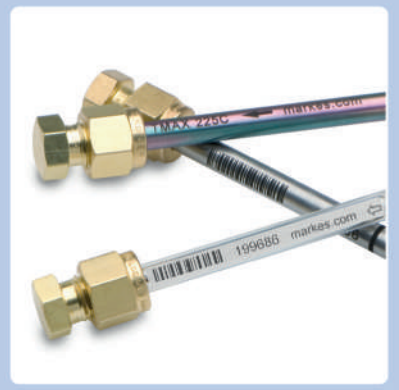
# Thermal desorption tubes

Ultimate solutions for dependable
VOC sampling and analysis

RECOM INDUSTRIALE s.r.l.









# TD tube sampling for VOCs and SVOCs

## Active sampling

- Analytes are captured onto sorbent tubes using pumps, chambers or sampling bags.
- Tubes can contain single or multiple sorbents.



## Passive/diffusive monitoring

- Short-term (1 to 8 hours) for workplace analyses.
- Long-term (up to 4 weeks) for indoor/outdoor air.
- Always uses single-bed sorbent tubes.
- For faster short-term diffusive sampling, see the POD sampler.



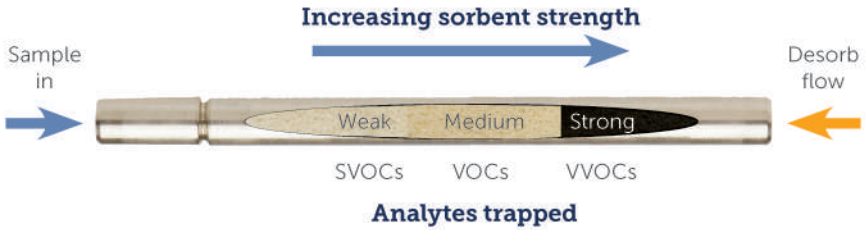
## Direct thermal desorption

- Solids/liquids are placed inside empty tubes for chemical profiling.
- Minimal sample preparation required.



# Markes' TD technology

**Markes' multi-bed sorbent tubes and focusing traps** allow a wider range of analytes to be adsorbed than the single-bed equivalent.




Analytes are trapped in one direction and desorbed off in the opposite direction to avoid irreversible binding to the stronger sorbents.

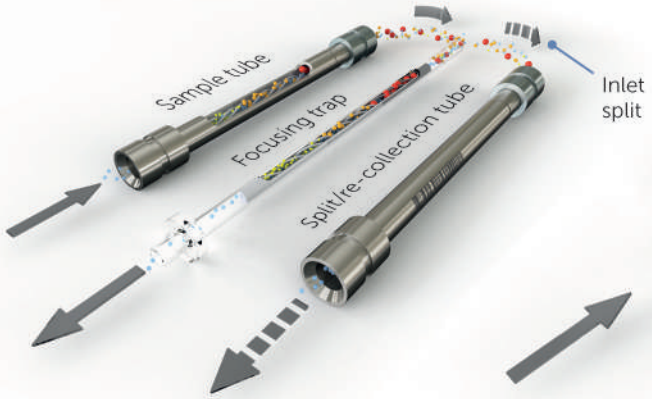
**Markes' patented heated valve** allows quantitative sample re-collection of inlet and outlet split flows, for confirmatory analysis and validation of results.

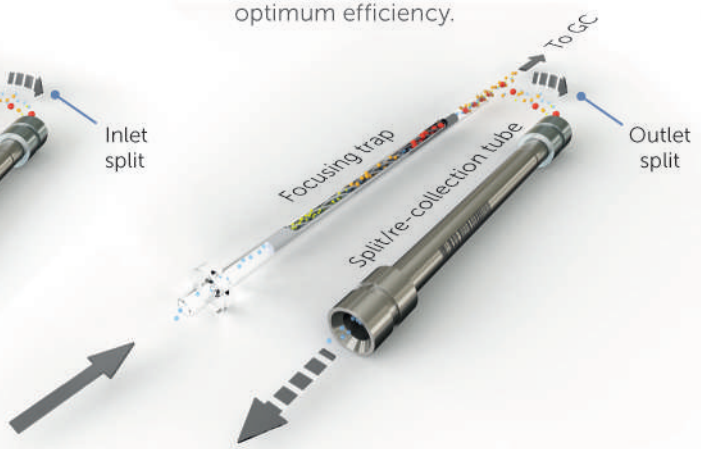
### 1 Tube desorption and inlet split

The sample tube is heated in a flow of carrier gas and the analytes are swept onto an electrically-cooled focusing trap, typically held between –30°C and ambient temperature.

### 2 Trap desorption and outlet split

The focusing trap is heated rapidly (up to 100°C/s) in a reverse flow of carrier gas, to transfer/inject analytes into the GC column in a narrow band of vapour for optimum efficiency.



# Choosing sorbent tubes and traps for optimal analytical performance

Selecting sampling tubes and focusing traps for TD is key to successful analyses, and involves considering a variety of factors. Packed with appropriate sorbent(s), tubes and traps allow quantitative analysis of a wide range of compounds, from $C_2$ hydrocarbons and freons to semi-volatiles such as PCBs, phthalates and PAHs, without requiring liquid cryogen coolant.

*This table focuses on application-specific sorbent tubes – other tubes are available. All tubes in this table are supplied in packs of 10, conditioned and fitted with storage caps.*

| Application | | | Standard method(s) | Sampling method | Recommended tube type | Recommended tube material | Tube part no. | Recommended focusing trap |
|---|---|---|---|---|---|---|---|---|
| ENVIRONMENTAL MONITORING | Ambient air | Air toxics/HAPs | US EPA TO-17 | Active | Universal; Air toxics | Stainless steel; Stainless steel | C3-AAXX-5266; C2-AAXX-5270 | Air toxics analyser: U-T15ATA-2S |
| | | | ISO 16017-1 | | | | | |
| | | | EN 14662-1 | | | | | |
| | | | Chinese EPA HJ 644 | Passive | *Dependent on target analytes – contact Markes to discuss* | | | IS5182: U-T26ISVOC-2S |
| | | | IS 5182 Part 27 | Passive | | | | |
| | | | IS 5182 Part 28 | Active | IS5182 Part 28 | Stainless steel | C2-AAXX-5459 | |
| | | PAHs | — | Active | PAH | Stainless steel | C2-AAXX-5189 | PAH: U-T21PAH-2S |
| | | PFAS | — | Active | PFAS extended volume | Stainless steel | C3-AAXX-5426 | PFAS: U-T24PFAS-2S |
| | | Semi-volatiles | — | Active | SVOC | Stainless steel | C3-AAXX-5342 | High-boilers: U-T1HBL-2S |
| | | Untargeted analysis | — | Active | Universal | Inert-coated | C3-CAXX-5266 | Air toxics analyser: U-T15ATA-2S |
| | Industrial emissions | Odorants | — | Active | Odour/Sulfur | Inert-coated | C2-CAXX-5314 | Sulfur (labile): U-T6SUL-2S |
| | | Landfill gas | LFTGN 04 | Active | | | | |
| | | Refineries | US EPA 325 | Passive | EPA 325 (Carbopack X) | Inert-coated | C1-CAXX-5020 | Method 325: U-T18325-2S |
| | Land analysis | Soil gas | — | Active | Soil gas | Inert-coated | C3-CAXX-5304 | Sulfur (labile): U-T6SUL-2S |
| | | Vapour intrusion | ASTM D7663 | Active | Odour/Sulfur | Inert-coated | C2-CAXX-5314 | |
| | | | ASTM D7758 | Passive | *Dependent on target analytes – contact Markes to discuss* | | | |
| Occupational hygiene and indoor air monitoring | Occupational hygiene | | MDHS 72 | Active | Universal; Air toxics | Stainless steel; Stainless steel | C3-AAXX-5266; C2-AAXX-5270 | Air toxics analyser: U-T15ATA-2S |
| | | | EN 107 6 | | | | | |
| | | | ISO 16017-1 | | | | | |
| | | | EN 838 | Passive | *Dependent on target analytes – contact Markes to discuss* | | | |
| | | | ISO 16017-2 | | | | | |
| | | | MDHS 80 | | | | | |
| | Indoor air | | ISO 16000-6 | Active | Material emissions; Tenax | Stainless steel; Stainless steel | C3-AAXX-5304; C1-AAXX-5003 | Material emissions: U-T12ME-2S |
| | | | ISO 16017-1 | | | | | |
| | | | ASTM D6196 | | | | | |
| | In-vehicle air (VIAQ) | | ISO 12219 series | Active | Material emissions | Stainless steel | C3-AAXX-5304 | |
| | | | OEM-specified | | | | | |
| | Cleanroom air | | VDI 2083-17 | Active | | | | |
| Material emissions | Automotive | Direct desorption | VDA 278 | Direct | Empty | Glass, 30 mm restriction | C0-NXXX-0000 | General-purpose hydrophobic: U-T2GPH-2S |
| | | Products and materials | ISO 12219 series | Active | Material emissions | Stainless steel | C3-AAXX-5304 | Material emissions: U-T12ME-2S |
| | | | OEM-specified | | | | | |
| | Products and materials | | ISO 16000-6 | Active | Material emissions | Stainless steel | C3-AAXX-5304 | Material emissions: U-T12ME-2S |
| | | | ASTM D6196 | | | | | |



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