

GERSTEL
certified **SUPPLIES**



Thermal Desorption System TDS



Pyrolysis Module PM 1



Tube Conditioner TC 1 / 2



Thermal Extractor TE 1 / 2



Thermal Desorption System TDS

The GERSTEL Thermal Desorption System TDS is the proven industry standard thermal desorption instrument for a range of applications. Standardized international methods in the field of Material Emissions for Automotive, Construction Materials, Semiconductors and Toys are based on the GERSTEL TDS. Further application examples include Flavor and Fragrance; Polymers and Packaging; Extractables & Leachables in Pharmaceutical Packaging; Residual solvents in polymers; and helping forensic laboratories determine if documents have been forged or altered.

The TDS enables thermal desorption of volatile and semi-volatile organic compounds (VOCs and SVOCs) from standard adsorbent tubes as well as thermal extraction of solids without further sample preparation. Up to 5 GERSTEL Twisters® can be desorbed using just one TDS tube and several desorptions can be performed in series for each GC/MS

run for additional sensitivity and improved limits of detection. GERSTEL thermal desorption and extraction solutions are specifically designed without valves or other complex components that are known to lead to cold spots and active sites. GERSTEL systems therefore ensure best possible recovery, even for active and high-boiling analytes, with the cleanest possible base-line ensuring accurate results and best possible limits of detection. A wide range of accessories are available for the TDS: Thermal Extractor (TE); Tube Conditioner (TC); Pyrolysis Module (PM 1); as well as manual or automated Tube Spiking systems (TSPS/TSS) for generating standard tubes as specified in several standard methods;

The MAESTRO software integrated with the Agilent ChemStation or GC MassHunter controls the complete process from sample introduction through thermal desorption to GC/MS analysis using just one method

and one sequence table ensuring efficient and error-free operation. GERSTEL systems are compatible with all standard GC/MS systems.

This Supplies catalogue provides a list of certified consumables, accessories and spare parts essential for the smooth operation of your GERSTEL® TDS. You have the right to demand the highest quality performance from GERSTEL systems and we have compiled this list so that this performance can be maintained throughout the life of your system. Please use only consumables, accessories and spare parts provided by GERSTEL. All GERSTEL products are made to exact specifications. Use of products not approved by GERSTEL can cause system malfunction or damage and may void system warranty. If you have any questions please do not hesitate to contact GERSTEL. Typically, the most efficient way is to contact your local sales representative.



Part No.

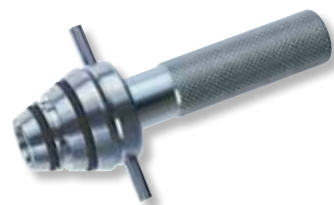
Spare parts for TDS 2/3 locking cone

O-ring set

for TDS 2/3 locking cone manual

1 set

0007884-000-00



Inner O-ring

for TDS 2/3-TDS A/A2 locking cone

1 package (5 units)

009095-005-00



Fixing nut for inner O-ring

for TDS 2/3 locking cone

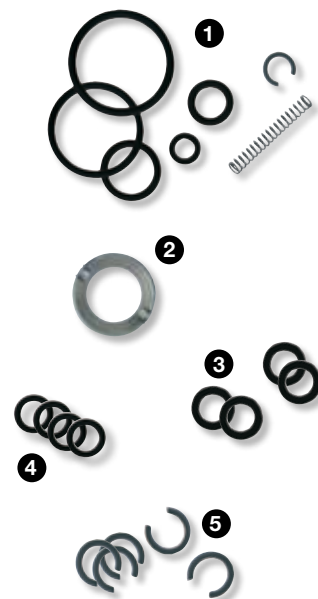
1 unit

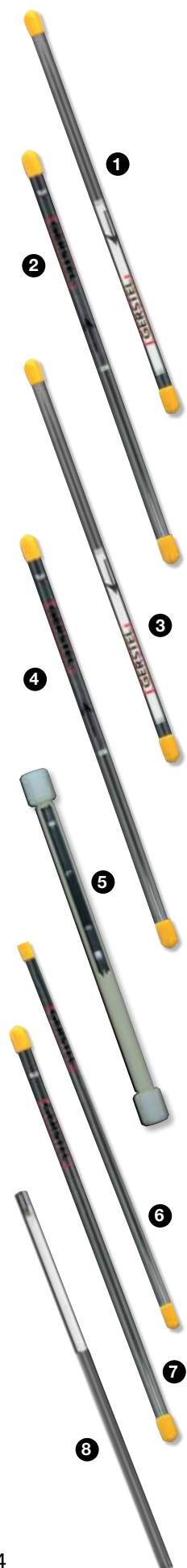
009013-001-00



Spare parts for TDS A/A2 locking cone

- | | | |
|----------|-------------------------------------------------------------------------------------------------------------------------|----------------------|
| 1 | Service kit for TDS A/A2 locking cone
consists of:
O ring set for locking cone
Spring
Locking washer | 010441-000-00 |
|----------|-------------------------------------------------------------------------------------------------------------------------|----------------------|
- | | | |
|----------|--------------------------------------------------------------|----------------------|
| 2 | Fixing nut for inner O-ring
for TDS A locking cone | 009013-000-00 |
|----------|--------------------------------------------------------------|----------------------|
- | | | |
|----------|------------------------------------------------------------------------------|----------------------|
| 3 | Inner O-ring for TDS 2/3/TDS A/A2 locking cone
1 package (5 units) | 009095-005-00 |
|----------|------------------------------------------------------------------------------|----------------------|
- | | | |
|----------|----------------------------------------------|----------------------|
| 4 | Spindel O-ring
1 package (5 units) | 010372-005-00 |
|----------|----------------------------------------------|----------------------|
- | | | |
|----------|----------------------------------------------------|----------------------|
| 5 | Spindel safety catch
1 package (5 units) | 011061-005-00 |
|----------|----------------------------------------------------|----------------------|





Desorption tubes

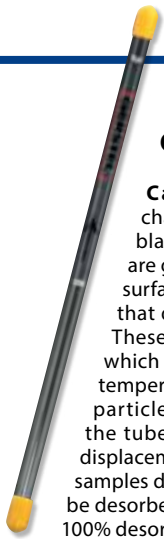
6 mm OD, for use with all GERSTEL TDS systems.

Each tube has a unique serial number for identification and traceability.

	packing	conditioned	description	units	Part No.
1	Tenax™ TA 60/80	–	glass tube with rubber caps	5	012260-005-00
2	Tenax GR	–	glass tube with rubber caps	5	012275-005-00
3	Chromosorb™ 106	–	glass tube with rubber caps	5	012276-005-00
4	Carbosieve™	–	glass tube with rubber caps	5	012277-005-00
	Carbotrap 300	–	glass tube multibed, with rubber caps	5	012346-005-00
	Carbotrap 300	–	glass tube (1 Set 5 units), multibed, with rubber caps	1	012347-005-00
	Tenax TA 60/80	–	with rubber caps	1	
	Tenax GR	–	with rubber caps	1	
	Chromosorb™ 106	–	with rubber caps	1	
	Carbosieve™	–	with rubber caps	1	
	Carbotrap 202 mg	✓	glass tube in storage container	1	012458-000-00
	Carbotrap B 50 mg	✓	glass tube in storage container	5	015244-005-00
	Carbotrap C 100 mg				
	Tenax TA 60/80	✓	glass tube in storage container	5	014752-005-00
	Carbosieve SIII™				
	Tenax TA 20/35	✓	glass tube in storage container	5	014656-005-00
	Tenax TA 60/80	✓	glass tube in storage container	1	009947-000-00
	Tenax TA 60/80	✓	SS tube in storage container	1	010040-000-00
	Tenax GR	✓	glass tube in storage container	1	009948-000-00
	Tenax GR	✓	SS tube in storage container	1	010041-000-00
	Carbosieve™	✓	glass tube in storage container	1	009949-000-00
	Carbosieve™	✓	SS tube in storage container	1	010042-000-00
	Carbotrap™ 300	✓	glass tube in storage container	1	008357-000-00
	Carbotrap™ 300	✓	SS tube in storage container	1	010044-000-00
	Carbotrap™ 349	✓	glass tube in storage container	1	009117-000-00
	Carbotrap 217	✓	glass tube in storage container	1	013115-000-00
5	Tenax / Carboxene	–	glass tube in storage container	1	009118-000-00
	empty	–	glass tube for GERSTEL Twister with 1mm film thickness	10	012518-010-00
	empty	–	SS tube	10	013790-000-00
	empty	–	glass tube	10	010649-010-00
6	empty	–	glass tube	1	010649-000-00
7	empty	–	glass tube with glass frit	1	010650-000-00
	empty	–	glass tube with glass frit	10	010650-010-00

Sorption tubes

	packing	conditioned	description	units	Part No.
8	PDMS	–	glass tube OD 6 mm, for gaseous samples	1	009171-000-00



Graphitized Carbon Blacks

Carbotrap/Carbopack: Unlike activated charcoals, which are porous, graphitized carbon blacks (GCBs), such as Carbotrap and Carbopack, are generally non-porous. Consequently, the entire surface of these materials is available for interactions that depend solely on dispersion (London) forces. These adsorbents offer excellent thermal stability, which ensures minimal bleed at thermal desorption temperatures, and their coarse 20/40 and 40/60 mesh particle size prevents a high pressure drop across the tube. Hydrophobic properties minimize sample displacement by water, enabling you to obtain accurate samples despite high humidity. Trapped compounds can be desorbed by solvent or thermal desorption at virtually 100% desorption efficiency.

Carbopack B is essentially the same adsorbent as Carbotrap; the only difference is the mesh size (60/80 mesh for Carbopack B vs. 20/40 mesh for Carbotrap). Both have a specific surface area of 100 m²/g. Carbopack B is often used in narrow bore tubes (1-2 mm ID), for sample refocusing or for very low flow sampling (<20 mL/min). This adsorbent is especially suited for trapping and thermally desorbing compounds in the range from C5 to C20 (depending on the size and structure of the molecule).

Carbopack C is essentially the same adsorbent as Carbotrap C; the only difference is the mesh size (60/80 mesh for Carbopack C vs. 20/40 mesh for Carbotrap C). Both have a specific surface area of 10 m²/g. Carbopack C is often used in narrow bore tubes (1-2 mm ID), for sample refocusing or for very low flow sampling (<20 mL/min). This adsorbent is especially suited for trapping and thermally desorbing compounds in the range from C9 to C30 (depending on the size and structure of the molecule).

Carbopack X, unlike most GCBs, is porous. Its surface area of 240 m²/g gives it greater adsorption strength than other GCBs, hence it is a unique bridge between GCBs and carbon molecular sieves.

Carbopack Y, with a surface area of 24 m²/g, bridges the characteristics of Carbopack B and Carbopack C.

Carbon Molecular Sieves

A carbon molecular sieve is the carbon skeletal framework remaining after the pyrolysis of a polymeric precursor. These materials are primarily used for collecting very small molecules (e.g., chloromethane, vinyl chloride, and Freon compounds). The size and shape of the analyte molecule and the size and shape of the pores in the adsorbent particle determine how well the analyte is adsorbed and desorbed.

Carbosieve S-III: The large surface area (approximately 820 m²/g) and 15-40 Å pores, make Carbosieve S-III excellent for trapping small airborne molecules, such as chloromethane. The pure carbon framework permits thermal desorption of analyte molecules without loss.

Carboxen

Carboxen carbon molecular sieves are highly hydrophobic, ensuring accurate sampling at high humidity.

Carboxen 1000 is for low volume sampling of very volatile compounds, such as vinyl chloride. Its large surface area and optimized microporosity enable it to efficiently adsorb and desorb smaller molecules, providing excellent chromatography without a need for cryogenic cooling. This 60/80 mesh adsorbent is used primarily in narrow bore tubes that are desorbed directly into the chromatographic column.

Carboxen 1003 has a large surface area and hydrophobic surface characteristics, which provide a combination of efficient adsorption/desorption and good hydrophobicity.

Porous Polymers

Tenax TA is a porous material based on 2,6-diphenylene oxide polymer. It is used to trap volatile and semivolatile compounds and has an upper temperature limit of 350 °C. The material has low affinity for water and methanol. When sampling for very volatile analytes with Tenax TA, a carbon molecular sieve is typically used as a backup.

Tenax GR is a composite material containing 30% graphite carbon and 70% Tenax TA. Compared to Tenax TA, it has a higher retention volume for most compounds and is twice as dense. Like Tenax TA, it has a low affinity for water and methanol and has an upper temperature limit of 350 °C.

Chromosorb 106 is a styrene-divinylbenzene polymer used to trap small molecules. It has a surface area of 750 m²/g and an upper temperature limit of 250 °C. Its usefulness is somewhat limited since it produces relatively high levels of background.

Multi-bed Adsorbent Tubes

Multi-bed adsorbent tubes contain a series of two or three different adsorbents beds packed in order of increasing strength from the sampling end of the tube. A combination of adsorbents enables the analyst to cover a wide range of compounds in a single analysis. The first adsorbent is the weakest, retaining only higher boiling analytes while allowing smaller compounds to pass to the following adsorbent(s). The first adsorbent bed retains analytes that may get irreversibly trapped on the subsequent, stronger adsorbent(s). During thermal desorption of the multi-bed adsorbent tube, the gas flow direction is reversed ensuring that higher boiling analytes will not have to pass through the strong adsorbent beds, where they would be retained. Multi-bed adsorbent tubes enable the analyst to combine the benefits of multiple adsorbents in a single analysis while eliminating effects such as irreversible trapping and loss of larger molecules.

Carbotrap 300 is a multi-bed tube comprised of Carbopack C, Carbopack B and Carbosieve S-III.

Carbotrap 349 is a multi-bed tube comprised of Carbopack Y, Carbopack B and Carboxen 1003.

Carbotrap 217 is a multi-bed tube comprised of Carbotrap B and Carboxen 1000.



Supplies for desorption tubes

	OD	description	units	Part No.
1 Storage Container	6 mm	Polycarbonate, with PTFE seals	1	008351-000-00
2 End cap set	6 mm	stainless steel, with PTFE seals	1	008235-060-00
3 End cap	6 mm	PTFE	10	012659-010-00
TD empty tubes	1/4 "	3,5 " long, stainless steel	1	011619-000-00
Screens		for positioning in 4 mm ID tubes	10	008980-010-00
Screens		for positioning TWISTER®s in 4.5 mm ID tubes	10	015686-010-00

4

Tweezers for handling TDS tubes

1 unit **009970-050-00**



O-rings for TDS A sample magazine

1 package (10 units) **008174-010-00**



O-rings for TDS A2 sample magazine

1 package (10 units) **015471-010-00**



Sealing plugs for TDS A/A2 sample magazine

1 package (10 units) **014173-010-00**

Part No.

TDS tube adapter for GERSTEL® TDS 3

Allows 1/4" OD x 3.5" L desorption tubes to be used with the TDS 3 (stainless steel tubes only)

1 unit	014454-000-00
1 set (21 units)	014454-021-00



Vespel cone

Vespel cone for TDS Tube adapter

1 package (5 units)	014456-005-00
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Screw driver SW 1.5 for TDS tube adapter

1 unit	013329-000-00
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Liquid injection kit for TDS 2/3

consists of:
Sealing cone with septum for liquid injection for GERSTEL TDS 2/3

1 unit	014450-060-00
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Special needle

for 10 µl syringe, length 115 mm

1 package (5 unit)	009970-059-00
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Septum

5 mm

1 package (100 units)	015608-100-00
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SLH calibration adapter

for spiking TDS tubes using the GERSTEL Septumless Head (SLH)

SFK / CIS 3	008871-003-00
SFK / CIS 4	008871-004-00



Special needle

for 10 µl syringe, length 81 mm
009970-016-00

1 package (2 units)	009970-049-00
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Supply kit for TDS 2/3 calibration adapter

includes 5 glass tubes with GP 3D ferrules and 5 teflon ferrules

SFK / CIS 3	010454-003-00
SFK / CIS 4	010454-004-00

Part No.



Direct interface

for 0.7 mm OD transfer line

System	for transfer line OD	units	
TDS 2/3 with CIS 3	0.70 mm / -	1	007823-007-00
TDS 2/3 with CIS 4	0.70 mm / -	1	008311-007-00
TDS 2/3 – TDS G with CIS 3s	0.70 mm / 0.53 mm	1	011025-007-00
TDS 2/3 with CIS 3s Tremetrics	0.70 mm / 0.53 mm	1	011628-007-00

Transfer lines

for TDS 2/3 with CIS 3/CIS 4, length 5 m

Version	deactivated	OD / ID	
ProSteel®	✓	0.67 mm / 0.53 mm	008687-005-00
Silcosteel®	✓	0.74 mm / 0.45 mm	010963-005-00
Sulfinert®	✓	0.74 mm / 0.45 mm	012185-005-00
Fused Silica	✓	0.70 mm	008644-005-00

Transfer line kit

for TDS 2/3 with CIS 3/CIS 4, length 1 m

Version	deactivated	OD	units	
ProSteel®	✓	0.67 mm	1	
GRAPHPACK 2M ferrule			10	011004-000-00
Silcosteel®	✓	0.74 mm	1	
GRAPHPACK 2M ferrule			10	011005-000-00
Sulfinert®	✓	0.74 mm	1	
GRAPHPACK 2M ferrule			10	012186-000-00



Direct interface

for 0.45 mm OD transfer line

System	OD	units	
TDS 2/3 with CIS 3	0.45 mm	1	007823-045-00
TDS 2/3 with CIS 4	0.45 mm	1	008311-045-00
TDS 2/3 – TDS G with CIS 3s	0.45 mm	1	011025-045-00
TDS 2/3 with KAS 3s Tremetrics	0.45 mm	1	011628-045-00

Transfer line

for TDS 2/3 with CIS 3 / CIS 4, length 5 m

Version	deactivated	OD	
Fused Silica	✓	0.45 mm	005014-005-00

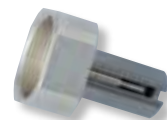
Transfer line kit

for TDS 2/3 with CIS 3 / CIS 4, length 1 m

Version	deactivated	OD	units	
Fused Silica	✓	0.45 mm	1	
GRAPHPACK 2M ferrule			10	011003-000-00

Part No.

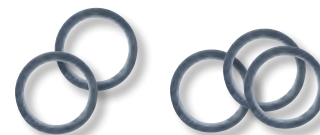
GRAPHPACK 2M adapter



for TDS 2/3, for 0.45 mm OD transfer line (1 unit)	007820-045-00
for TDS 2/3 and TDS G, for 0.7 mm OD transfer line (1 unit)	007820-007-00

Silver seal

for GRAPHPACK 2M adapter
for TDS 2/3 and TDS G



1 package (5 units)	007821-005-00
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Spare parts for TDS G

GRAPHPACK Micro screw

single, 0.70 mm

1 unit	007910-007-00
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GRAPHPACK Micro ferrule

0.70 mm

1 package (10 units)	001905-007-00
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Adapter for GRAPHPACK Micro screw

For use with Valco Vici valve 1/16"

1 unit	008688-007-00
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GRAPHPACK 2M injector adapter

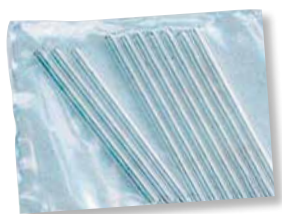
for Valco Vici valve, 1/16"

1 unit	008019-045-00
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GERSTEL® Pyrolysis Module PM 1

Manual Pyrolysis module for the TDS.



Sample tubes

for GERSTEL® Pyrolysis Module PM1

Part No.

1 package (10 units) **009250-010-00**

1 package (50 units) **009250-050-00**

Part No.

Pyrolysis TDS tube

for GERSTEL® Pyrolysis Module,
6.0 mm OD; 5.0 mm ID

Note
for use with Pyrolysis Module
only

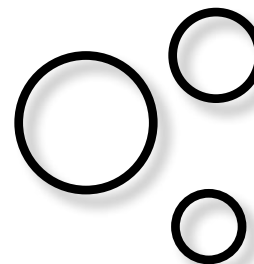
Quartz glass		
1 unit		009553-100-00
Borosilicate glass		
10 units		009553-010-00



Spare parts

O-ring set for TDS 2/3 manual locking cone

1 set		007884-000-00
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Inner O-ring for TDS 2/3 locking cone

1 package (5 units)		009095-005-00
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Fixing nut for inner O-ring

for TDS A/A2 locking cone

1 unit		009013-000-00
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GERSTEL® Tube Conditioner, TC 1 / 2

For simultaneous conditioning of up to ten TDS tubes or up to 50 Twister®s (5 Twisters per TDS tube). Tube conditioning is performed under a flow of inert gas at elevated temperatures. The gas flow to each tube is independently controlled allowing full loading flexibility. The GERSTEL TC 2 operates independently of the analytical system, eliminating the risk of system contamination and ensuring maximum productivity.

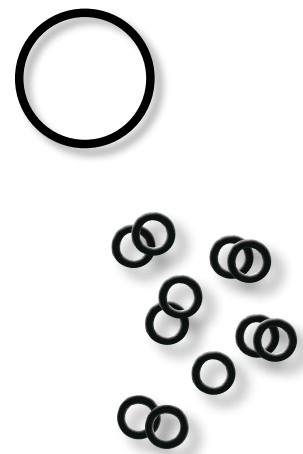


Part No.

O-ring set for TC 1 / 2 tube holder

1 package (1 set)

009650-000-00



TDS desorption tubes

for 1 mm film thickness Twisters; tube 6 mm OD x 4.5 mm ID

1 package (10 units)

012518-010-00



GERSTEL® Thermal Extractor, TE 1 / 2

The GERSTEL Thermal Extractor TE 2 enables the analyst to extract volatile and semi-volatile organic compounds from liquid or solid samples, trapping the compounds on a TDS tube for further analysis. For aldehyde analysis, analytes can be trapped on a DNPH tube for subsequent liquid elution and LC analysis. The GERSTEL TE 2 has a larger inner diameter than normal TDS tubes. Larger sample volumes can be analyzed to obtain lower detection limits. A larger, more representative sample volume also ensures better results when analyzing inhomogenous samples. The GERSTEL TE 2 is completely independent of the TDS system, eliminating the risk of system contamination when analyzing unknown samples.



O-ring set for tube holder

complete set of inner and outer O-rings



008634-000-00

Inner O-ring for tube holder



1 package (5 units)

009411-005-00

Part No.

Empty tubes for GERSTEL® TE

1 package (5 units)

008589-005-00



Inner O-ring for TE tube holder

Kalrez (1 unit)

008766-000-00



**PTFE ferrule for TDS
desorption tube**

1 package (5 units)

002732-005-00



**Desorption tubes for TDS 2/3
and TDS A/A2**

see pages 4 – 6

Screens for TE tube

1 package (10 units)

008590-010-00





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