

SOIL SCIENCE
Column leaching tests



COLUMN TESTS

Mineral by-products, waste and soil material form the bulk of Germany's material flows with potential environmental impact, with approximately 200 million tonnes flowing annually. Before these material can be reused, e.g. in roads and landscaping, they need to be safely recovered.

For this purpose, ecoTech has developed, in collaboration with the Federal Institute for Materials Research and Testing (BAM), an Automated Column Percolation System (ASPA). This new system results from our long-standing cooperation with BAM and can be flexibly combined and adapted to different industry and material-specific requirements and test methods.

Available for purchase from ecoTech are the individual elution columns, semi-automatic elution units or professional, fully automated percolation units, which enable a high sample throughput.

The modular design ensures that you can integrate existing devices from our simpler range when upgrading to a higher-quality system. Just call us if you have any questions.

ecoTech Umwelt-Meßsysteme GmbH



Gefördert durch:



aufgrund eines Beschlusses
des Deutschen Bundestages

Note: The equipment was developed as part of a cooperation between the company ecoTech GmbH and the Federal Institute for Materials Research and Testing (BAM). The work was funded by the Federal Ministry of Economics and Technology as part of the ZIM program (Central Innovation Program for SMEs). Funding Code: KF 2201007MK9 and KF 2325001MK9



[01] Basic Set | Elution Columns (design patent protected)



Application

Perform manual column tests in conjunction with existing laboratory equipment such as pumps, water tanks, bottles etc.

Properties

- Easy installation and column filling
- Three different column sizes available (others on request)
- Concept based on requirements according to DIN 19528: 2009
- Increased pressure resistance thanks to tool-free mountable clamping lock
- Drop weight for uniform compaction of the sample material
- All ecoTech elution columns have a protected registered design

| Technical data | Column 50 | Column 65 | Column 100 |
|---------------------------|------------------------|-----------|------------|
| Inner diameter glass tube | 50 mm | 65 mm | 100 mm |
| Outer diameter glass tube | 60 mm | 75 mm | 110 mm |
| Height glass tube | 300 mm | 320 mm | 440 mm |
| Volume glass tube | 589 ml | 1.062 ml | 3.456 ml |
| total height | 410 mm | 440 mm | 610 mm |
| Material glass tube | Borosilicate glass 3.3 | | |
| Material closure | Polyethylene (PE) | | |



[02] Erweitertes Set | Elutionseinheit



Application

Perform semi-automatic column tests

Impetus

In order to comply with strict DIN specifications, we needed to be very precise in the design, taking into account the many individual components of column test systems. Following a development process that has been ongoing since 2009, we were able to settle on a very narrow selection of components and materials that are DIN compliant. In our experience, each of the components listed below can potentially be a critical source of error. Their thoughtless use therefore easily leads to exceeding DIN tolerance limits, leading to the necessary repetition of the time-consuming elution test.

We offer a set of components that has been developed over extended tests, which simplifies and reproducibly ensures the performance of column elutions:

Essential components

- High-precision diaphragm metering pump
- Downstream pressure relief valve
- Matched geometry of the pump head
- Arrangement of the pressure holding valve with special holding device
- Factors on the pump inlet:
 - tubing
 - hose length
 - tube dimensions
 - fittings
 - prefilter



Advantages

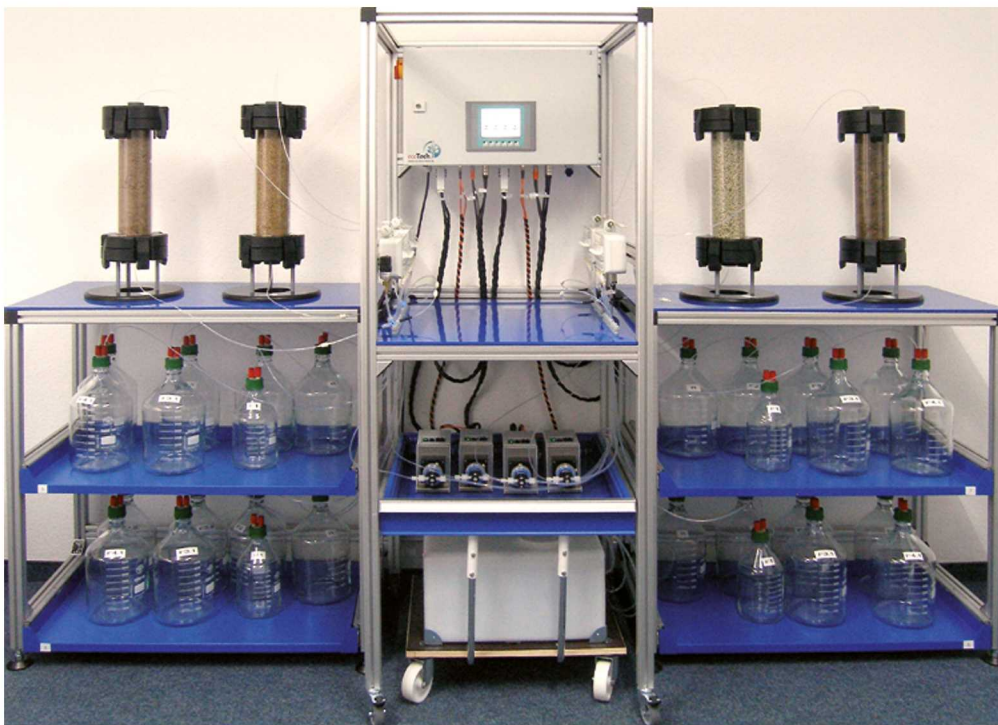
- Complete set for the semi-automatic performance of column tests
- Stable and accurate flow even with back pressure through the filled column
- Secure against dry run of pump and water jets
- Intuitive operation and easy calibration
- Components can be integrated later in ASPA

Set versions

consisting of

| Elution Set 435ES.50 | Elution Set 435ES.65 | Elution Set 435ES.100 |
|--|--|---|
| <ul style="list-style-type: none">• Elution column, 50 mm (see basic set)• high-precision diaphragm dosing pump• pressure-retaining valve• hoses• fittings• prefilter additionally required: <ul style="list-style-type: none">• eluent reservoir• eluate bottles (available on request) | <ul style="list-style-type: none">• Elution column 65 mm (see basic set), otherwise as above | <ul style="list-style-type: none">• Elution column 100 mm (see basic set), otherwise as above |

[03] Professional Set | Automated Column Percolation Unit (ASPA)



Automated Column Percolation Unit (ASPA) for the simultaneous performance of four separately controlled elution tests; essential components: 4 columns, 4 pumps, 4 hydraulic distributors, eluate bottles, water tank, control module with monitoring function and network connection; completely housed in a custom-made shelving system with full drawers



Application

Implementation of fully automatic column tests

Properties

- Automatic test execution
- Independence of laboratory work times
- Independent fractionation
- Modular construction
- Individual configuration
- High sample throughput
- Standard tests such as DIN 1955, NEN 7373, (DIN) EN 14405 (CEN/TS 14405), CEN/TS 16637-3
- User-specific tests programmable
- Remote monitoring possible

Components

Control Module

- Control and monitoring of all processes
- Process display and operation via touchscreen
- Secure autonomous operation (for example, when PC crashes)
- Emergency shutdown if the set pressure is exceeded

PC software

- Easy entry and management of process data
- Alarm management, operation and incident logging
- Creation of GLP logs following completion of the test

Columns

- See above under [1] "Basic Set"

Pump

- See above under [1] "Extendet Set"

Hydraulic distributor

- Division of fraction under exclusion of air
- No rotating components
- No contact of the eluate with valve components
- Fast replacement of hoses
- Low dead volume

Collection flask

- Borosilicate glass 3.3 with screw cap
- Cascade connection for large sample volumes
- Eluate transfer under exclusion of air
- Very good chemical resistance

Storage tank

- Mobile with wheels and handle
- Large capacity (50 l)
- Space-saving storage in the ASPA shelf

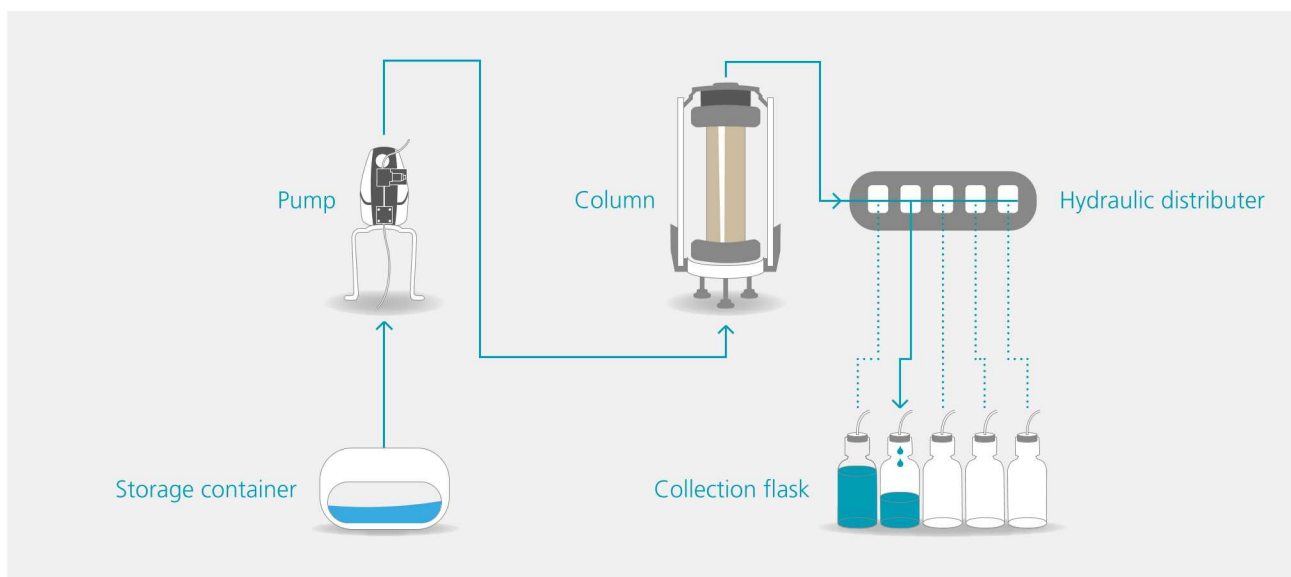
Shelving

- Space saving and ergonomic
- Full drawers
- Modular and expandable

Case weight

- Defined weight and drop height
- Uniformly sealed
- Easy to use

Process flow during a percolation





Overview

| | Basic Set Elution columns | Extended Set Elution unit | Professional Set ASPA |
|--|------------------------------|------------------------------|--------------------------|
| Simple execution of column tests | ✓ | ✓ | ✓ |
| Accurate and consistent flow rates during test run | ✗ | ✓ | ✓ |
| Different saturation and test flow rates possible | ✗ | ✗ | ✓ |
| Fractionation | ✗ | ✗ | ✓ |
| Pressure monitoring | ✗ | ✗ | ✓ |
| Logging | ✗ | ✗ | ✓ |
| Automatic performance of column tests | ✗ | ✗ | ✓ |

References



Bundesanstalt für
Materialforschung
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35 years of ecoTech – Innovation and Competence

For 35 years we have developed, produced and supplied measuring and monitoring systems for water – soil – air.



HYDROLOGY

- Multiparameter-Sondes YSI EXO
- Handheld meters YSI ProPlus, ProDSS
- Profiler, vertical water column measurements
- Single-Parameter data logger
- Level Logger
- Radar sensor, non-contact discharge measurement
- Buoys
- Monitoring stations



METEOROLOGY

- Stationary weather monitoring systems
- Mobile weather stations
- Sensors for wind, radiation, temperature, relative humidity and precipitation
- Data logger with up to 48 channels
- Data logger for long-distance data transmission



SOIL SCIENCE

- pH and redox monitoring in field and laboratory
- Tensiomark™ – Matric potential and temperature
- Hydra probe – Soil water content, temperature and EC
- pF laboratory station & add-on modules for pF curves
- Suction plates and suction cups
- ASPA – Automated column percolation test device
- Laboratory lysimeter and laboratory soil columns
- Soil profile tape measure



ECOLOGY

- Arboreal photo-electors
- Ground photo-electors
- Air and water photo-electors
- automatic extractors according to MacFadyen/Kempson
- Vacuum insect collector ecoVac
- Accessories



All current products can be found online at www.ecotech-bonn.de

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