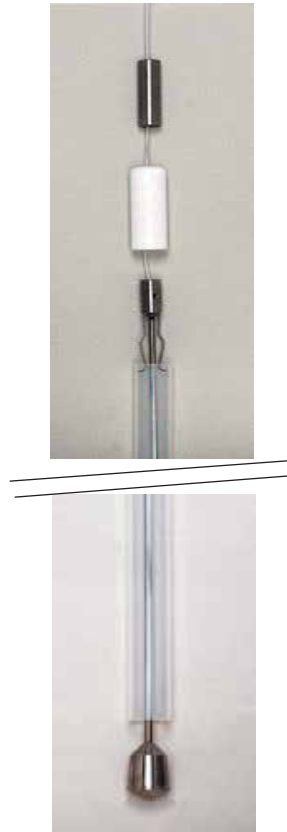




LIQUID LAYER SAMPLER



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1. Description

This sampler was developed to determine the presence and thickness of a floating layer on the air-liquid interface.

It can also be used to take a sample on any depth in a liquid, for instance to determine the presence of a heavy liquid like tetra or tri under water. The contents may be used for all types of analysis. This sampler cores samples 90 cm long and 32 mm wide, in virtually all liquids and at the liquid-air interface. The net volume is 700 ml.

The wire-operated sampler cannot be operated in thick viscous liquids, use the Multisampler there (art. no. 12.42).

This sampler may simply be transformed to a rod-operated sampler, e.g. for sampling drums, by adding the rod (12.40.11). Standard wire length is 5 m. Other wire lengths are also available.

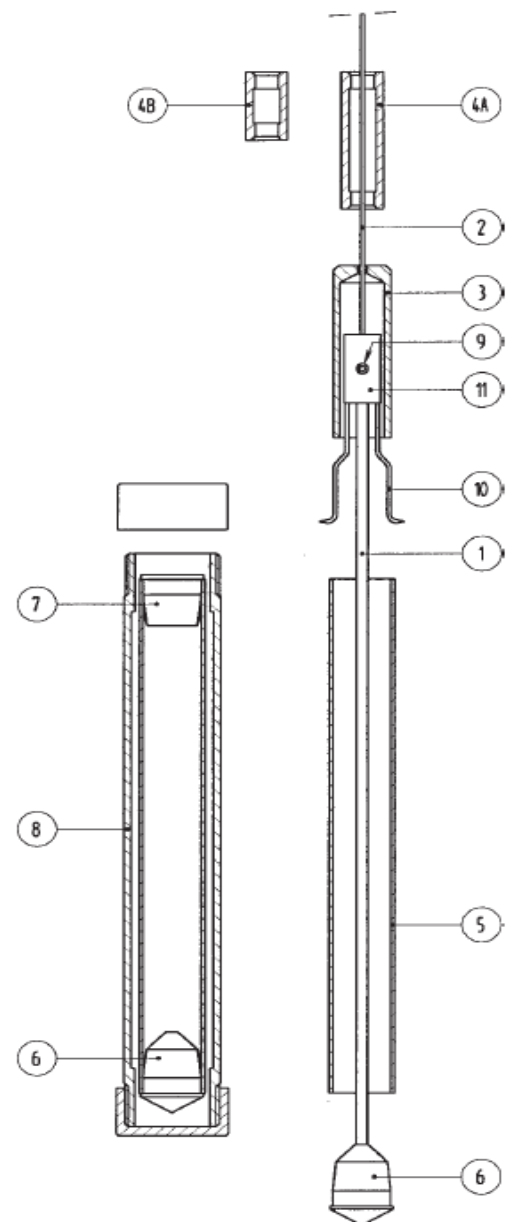
The thickness of sludge- and floating layers can be measured as they are clearly shown through the translucent tube (5).

Two materials of choice (teflon and stainless steel) make this sampler a safe and reliable sampling tool.

The sampler will not contaminate, if properly cleaned and used, water samples that are analysed on very low concentrations of volatile organics or trace metals.

The sampler may be effectively used to sample toxic chemicals as well.

Transferring the sample is not necessary; you may store and transport the sample in the sample tube itself, protected by a rugged HDPE transport tube (8). In all cases decontaminate the sampler carefully with a decontamination liquid.





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2. Taking into operation and decontamination

Every liquid layer sampler leaving our facility has been subjected to a severe quality control. Check, upon arrival, if all necessary and ordered parts are included and intact.

At least you will need:

1. An operating rod (1; see drawing on page 2), fitted with clip (10), teflonised wire (2), white teflon receiver (3), stainless steel messenger for operation of the equipment till 5 m depth or on greater depths below water (4a), messenger for use of the equipment on depths larger than 5 m above water (4b) and a small hexagonal wrench (art. no.: 12.41.11).
2. A transparent teflon tube (5), art. no.: 12.40.01.
3. A conical stainless steel bottom stopper (6), art. no.: 12.40.31.

If a sample should be stored in the sample tube, some supplementary equipment is needed:

4. A top stopper (7), art. nr. 12.40.32.
5. A HDPE transport tube (8), art. no. 12.40.21.

Of course optional equipment may be included, like:

6. Teflonised cable from 25 or 50 m length (art. no.: 12.16.42 or 12.16.41).
7. Small reel to store and operate the sampler fitted with 5 m cable (art. no.: 12.16.45).
8. Large reel to store and operate the sampler fitted with 25 or 50 m cable (art. no.: 12.16.47).
9. Wide mouth sample bottles (Art. no.: 99.08.07).
10. Decontamination fluid (art. no.: 20.05.29).
11. Stainless steel bucket (Art. no.: 99.08.10).
12. Carrying bag (Art. no.: 01.14).
13. Extra teflon tubes, bottom and top stoppers and transport tubes.

Do not take the device into operation unless you read this manual. Keep this manual at a place accessible to every user.

Decontaminate the device previous to introduction, this avoids disappointment on reception of the first analysis results.

In the laboratory decontamination can be executed using a dishwasher applying an alkaline detergent free of phosphates. This removes the organic as well as the anorganic substances. Check, and remove the remaining detergent by rinsing.

In the field it is possible to decontaminate for anorganic as well as organic substances using a diluted detergent. It is recommended to use Deconex (art. no.: 20.05.29) which is free of phosphates. Immerse the parts in the HDPE transport container or apply the decontamination fluid using a soft brush or a low pressure sprayer.

Always rinse the parts twice using demineralised water.

Isopropylalcohol and wipers may be used to quickly clean the tool in the field. Because of the high temperature resistance of teflon (well over 250 °C) sterilisation can take place in an ordinary autoclave. Sorbed volatiles are removed with time and heat.



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Another wire should be mounted if sampling depth exceeds 5 m. To do this remove, by using the hexagonal wrench, the original wire and replace with a longer one. Securely tighten the screws (9) that must hold the wire. Do not forget to install one of the messengers.

Keep points of the clip (10) extremely sharp. Bend out clip if elasticity has disappeared. If the points need resharp-ening, take care to grind in a lateral direction (perpendicular to the rod) in order to get maximum friction of the points to the teflon tube. If sampling in wells with obstacles that may hinder lowering the device smoothly, consider drilling or punching two 3 mm holes 10 mm from the top of the teflon sampling tube.

3. Using the device

3.1 Some theory

3.1.1 Operation

Ordinary bailers have high inflow and flow-through resistance because of the strictures from the ball check valve(s). This limits severely the application possibilities of bailers for checking on floating or heavy liquid layers in monitoring wells. Normal bailers will miss floating layers of about 3 cm thick!

When slowly lowering the liquid layer sampler into a liquid, the penetrated liquid will flow freely around the cone and resettle. In the sampling tube there are no strictures or valves to hinder viscous fluids when they flow through the tube. You will get a representative core from the layers as they were originally situated in the reservoir or the well at that depth. (However retarded movement of the fluids in the sampling tube cannot be excluded). The open construction also reduces the risk of contamination from remainders of passed upper- layers. Due to this a perfect core sample of the liquid-air interface will be taken. During retraction of the filled and closed sampler practically no new liquids from upper-layers can mix with the sample.

3.1.2 Monitoring wells

The liquid sampler will allow accurate measurements of layered liquids in monitoring wells. Quantitative measurements will however only be possible when the perforated part (the screen) of the monitoring well is well above and well below the zone of interest. For instance a soil with a water table varying from -3.5 to -4.5 m will need a monitoring well with a screened part at least covering the soil layers from 3 to 5 m deep. Such a well could be named "floating layer detection well".

When a floating layer is found in a normal monitoring well (with the screened part well below the water table you must conclude that there is:

- a leak between the sections of the blind pipes or,
- the liquid has been drawn into the well during a pumping event due to the drawdown of the water table that will occur then or,
- during a period of drought the "water" table has dropped beneath the top section of the screened pipe having allowed the inflow of the floating liquid.

Good "floating layer detection wells" will accumulate approximately 4 - 10 times the thickness of the real saturated liquid layer in the soil (due to the absence of capillary effect in the monitoring well). This means that generally less hydrocarbons are present in the soil than are measured with an electronic or physical measurement instrument. The liquid layer sampler will allow you to measure the thickness of the floating layer in the well accurately and to calculate the thickness of the contaminated soil layer that is really present.



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3.1.3 Heavy layer detection

When wanting to detect heavy liquids in monitoring wells (like chlorinated hydrocarbons) this well should preferably go down into a hydraulically impermeable layer. Another possibility is to fit the monitoring well at the bottom with a piece of blind pipe (sack). You could name such a well a "heavy liquid detection well".

3.1.4 General liquid sampling

The liquid layer sampler may be used as a normal bailer sampler too.

3.1.5 Contamination of monitoring wells by contaminated soil layers

For further research of contamination of deeper soil layers it is good to be aware of the fact that due to their permeability, plastics will allow volatiles to permeate through a blind monitoring well pipe contaminating the water inside the well. This means that samples from deeper non-contaminated water may be polluted by volatiles having permeated through the blind plastic pipes of the well.

This may be prevented by:

- Using a steel casing as the riser pipe or installing a steel casing around the plastic blind pipes of the monitoring well.
- If this is/was not done, purge the water column in the well completely and with a lot of turbulence (to improve flushing of water with hydrocarbons plated to the well's interior).
- Sample with a sample tube with a low permeability coefficient (teflon, PVC, HDPE instead of the normal LDPE) and extending into the screened part of the well.

3.2 Practice

3.2.1 Liquid layer sampling and measurement

When working with this equipment wear protective clothing, gloves and safety glasses.

Principle: The sampler is lowered in an undisturbed liquid. The top half of the sampler must stay well above the upper liquid level if examining the liquid-air interface. When lowered the device will core the (layer(s) of the) liquid. When the messenger is dropped, these layers will be captured in the teflon tube.

When sampling till a depth of 5 meter, mount the heavy messenger (4a). If you want to take a sample at a depth greater than 5 meter, with the operating mechanism (3, 11 and 10) below the water level, also mount the heavy messenger (4a).

When sampling at a depth larger than 5 meter and the operating mechanism above the water, mount messenger 4b.

Mounting is done by unrolling of the cable and changing the messenger.

Take wire-fitted operation rod and slide teflon tube over rod onto the clip.

Screw stainless steel bottom stopper on lower end of rod. Squeeze clip with fingers and place sharp points not more than 10 mm under top rim of tube. Put sampler upright on floor and slip white teflon receiver on receiver guide (11), fitted with clips. Drop stainless steel messenger on teflon receiver and check if white receiver operates clips correctly (receiver must pinch clips, teflon tube must drop and close on bottom stopper). Bend out clip if elasticity has faded.



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Lower sampler half way down into the liquid by smoothly letting slip the teflon cable through your fingers and while holding the messenger in your other hand (listen carefully for the bottom stopper to touch the liquid or determine the liquid level before sampling).

Drop stainless steel messenger. Clips will release tube to close on bottom stopper.

Pull up sampler. Lift filled sampler and put sampler in glas jar to drip out (or wipe off).

3.3 Judging contents

Where do you want to judge the contents:

- In the field? Proceed to "Judging contents in the field".
- In the lab? Proceed to "Judging contents in the laboratory".

3.3.1 Judging contents in the field

Wait, depending on the viscosity of the liquids, five to twenty minutes for the contents to stabilize. Judge contents and measure thickness of the layer(s). If wanted, take sub-samples of top layers by means of a pipette, plunging siphon (12.18.02) or peristaltic pump (12.23 or 12.25).

If wanted, sub-sample the sludge layer or heavy liquid layer, by slowly retracting the sample tube from the bottom stopper. Gather sub-sample in wide-mouth jar.

To empty and gather entire sample (disturbed): Put sampler in wide mouth jar. Gently retract tube from bottom stopper. Sample will flow in jar.

Decontaminate all parts. Store device in clean transport tubes in a well ventilated area.

3.3.2 Judging contents in laboratory

After lifting the sampler out of e.g. a well, slide sampler (after dripping out in a wide mouth jar) into HDPE transport tube. Firmly push tube on bottom stopper. Screw out rod. Push top stopper on inner (teflon) tube. Screw on HDPE top cap. Put on a seal if required. Transport sample in an upright position.

In a laboratory, screw rod (or simple screw with 6 mm threading) and lift out sample tube by pulling up top stopper. Then remove top stopper (wiggle out).

Judge sample, take (sub-)samples from contents

Decontaminate all parts. Store device in clean transport tubes in a well ventilated area.