

Device for surface sampling and method of manufacturing the deviceTechnical field

[0001] The present invention relates generally to devices for surface sampling.

Background art

[0002] It is known to use adhesive patches for surface sampling, e.g. as described in relevant ISO-Standards, such as e.g. ISO-8502-6, in this technical field.

[0003] It is known to use adhesive patches for surface sampling comprising a protective sheet to be removed prior to attaching the patch to a surface. Prior art document WO2015/147729 A1 by the applicant describes a device for surface sampling wherein a protective layer extends beyond the boundary of a surface portion of the device for facilitating a removal of the protective layer from the device.

[0004] Certain requirements have to be met according to a test described in the relevant ISO-Standard in this technical field in terms of withstanding the increased pressure resulting from filling the sampling compartment without leakage occurring which e.g. could result in an incorrect analysis result. In order to comply with such requirements whereby the device is firmly fixed onto a test surface and a seal against leakage of washing/extracting liquid is prevented, a sufficient adhesion between the device and a test surface is necessary. As a result, since adhesion and adhesive forces between the device and surface is often stronger than cohesion of the material of the device, difficulties arise after use of the same, when the device is to be removed from the surface. A well-known drawback with the known art is thus that residues of the device is often left on the surface and is thereafter difficult to remove. The devices are therefore generally removed within a short time after carrying out a test/sampling to reduce the effect of an increased adhesion between the test surface and the device over time. Often, only one or a few devices are used at the same time for this reason, which reduces the overall efficiency as well as the ability to sufficiently document the tests, e.g. by taking

photographs and documenting the exact locations of the test surfaces/locations as well as the time the adhesive patches have been attached to a surface. Using, on the other hand, both a strong adhesive and a strong material with high cohesion will give a device that is very difficult to remove from a surface. Usually, the removal of residues requires the use of a knife or scrape followed by application of a solvent or an extra sand blasting procedure. In many instances, however, the use of solvent or blasting procedures are not possible or wanted as they cause damage to certain sensitive surfaces, creates a hazardous working environment or necessitates cleaning afterwards. This is further a time consuming procedure often carried out in industrial environments for example in the ship building industry, wherein the surfaces to be analyzed are difficult and dangerous to reach, for instance vertical ship sides or walls or roofs in ballast tanks or standing on unsafe scaffolds or ladders with falling risks present. To reduce the risk an operator needs to have focus on the work position being secured in a manner preventing a fall, for instance by holding on suitable objects. Further, the work related to surface sampling may be made in areas of very limited lighting conditions. Any additional, unwanted time and extra focus required to remove remains of an adhesive patch increases the exposure to this risk. Prior art document WO2018/004446 A1, by the applicant describes a device for surface sampling with removal device that addresses these drawbacks and which is easier, less time consuming and therefore both more economic and safer to use. Furthermore, the device described in this prior art document is more versatile and enables the use of stronger adhesives.

[0005] Many tests or samples are made in industrial environments for example in the ship building industry, on offshore structures or fish farms. The use of anti-fouling paints on e.g. the outer bottom surface of the hull ships, so called bottom paints, to slow the growth of and facilitate detachment of marine organisms that attach to the hull are well known. These paints are known to reduce friction and thereby increase the energy efficiency making need for less fuel and giving less carbon dioxide emissions.

[0006] Self polishing Anti-fouling coatings (SPC) or paints have historically contained copper compounds which can have adverse effects on the marine environment and organisms, especially as such paints often are so-called soft or abrasive paints and intentionally meant to slowly slough off in the water. In the field of anti-fouling coatings for ships, recent developments has led to the use of Teflon or silicone binders to produce coatings which provide non-stick surfaces, or low-energy surfaces, which prevents marine growth to stick to ships hull. Silicone fouling release coatings have been developed with different surface properties of being Hydrophobic, Hydrophilic and Amphiphilic. This is developed by adding silicone oils in the formulation which form hydrogel when in contact with water. Low energy surfaces, or surfaces with low surface energy, provides very little attraction and is very difficult to bond to, and typically surfaces with a surface energy below 36 dynes/cm are categorized as low energy surfaces. Some of the products with hydrogel formation can have quite high surface energy of around 70 dynes/cm. However, a challenge and drawback with these coatings, e.g. silicone based coatings, is that insufficient adhesion is provided by the adhesive of the present devices for surface sampling and adhesive patches. As a result, the adhesive patch may be difficult, or even impossible to use on such surfaces as the adhesive patch may fall off and/or be unable to hold the ISO standard amount of prescribed washing fluid without leakage, or it at least undesirably allows air or dirt to enter from the outside, causing contamination of the sampling compartment. The importance of a watertight seal in the tests using the adhesive patches is further emphasized in the relevant ISO standards.

[0007] Thus, as a result, despite the environmental benefits of low energy coatings as outlined above, such as silicone coatings, there is at present no means for an accurate testing according to the established methods as defined in the relevant ISO standard, ISO 8502-6, of surfaces with such coatings. Such tests can be e.g. carried out before painting/coating or re-painting/re-coating including coating of steel surfaces on "new" surfaces or in connection with reparations and maintenance. A common surface could for instance be the surface of hulls of ships. The underlying surfaces can also be made from other materials such as cast iron for water power plant turbines. The described coatings are expensive and

usually applied in multiple steps and in many layers, typically up to 3-7 layers in certain cases resulting in thicknesses of 300-700 μm . Tests needs to be carried out between each step to test the cleanliness on the surface and identify any contaminations before applying the next coating layer. There is thus an obvious need for carrying out tests on these type of coatings in a reliable manner. If for instance salt water mist settles on the surface it will cause blistering and coating delamination during the service due to reverse osmotic phenomenon and cause a disaster on the hull coating of a ship potentially resulting in millions of loss for the owner from repair cost and off-hire costs of the vessel. But if the controls are carried out in suspicious situations then there will be very high certainty in the quality of the applied coating. Thus, the need exists to measure different impurities on the silicone surface before and after cleaning in marine repair projects. The main target impurity is salt for marine maintenance, but in special cases any other impurity can be measured)

[0008] Furthermore, other application areas of such silicone based coatings are on the wings of wind turbines, or on the blades or other parts of water turbines, to reduce friction and increase efficiency.

[0009] Furthermore, some manufacturing methods of surface sampling devices using rolls/punches may provide for waste or residues to release from parts of the device, including the so called filler device, and enter the sampling compartment. The manufacturing environment itself may allow for dust and dirt to enter the sampling compartment in an undesirable way during manufacturing. This may cause waste to later enter the syringe with negative effects or provide visible waste particles in the products that reduces appearance and perceived quality eventually leading to discarding of the products which is costly and negative from an environmental perspective.

Summary of invention

[0010] An object of the present invention is to create a device for surface sampling which reduces the risk of contamination in the sampling volume.

[0011] Another object of the present invention is to create a device for surface sampling which is possible to use on coatings or surfaces comprising silicone. A further object of the present invention is to provide a device for surface sampling that can be used on low-energy or non stick surfaces or surfaces comprising silicone, which is easier, less time-consuming and therefore both more economic and safer to use. A further object of the present invention is to provide a device for surface sampling that can be used on silicone surfaces which is more versatile and enables the use of stronger adhesives.

[0012] According to one embodiment, a device for surface sampling is provided, comprising: a material layer comprising a surface portion and a circumferential edge portion defining the boundary of the surface portion, further comprising a sampling volume, wherein the sampling volume is adapted to comprise a filler device for filling out the sampling volume,

a protective layer arranged on the surface portion of the material layer by an adhesive arranged on the surface portion of the material layer,

wherein the device is configured to be attached to a surface by removal of the protective layer to expose the adhesive layer prior to attachment, wherein the device is further configured to receive washing/extraction liquid in the sampling volume during attachment to the surface,

wherein the sampling volume does not comprise a filler device.

[0013] According to one embodiment, the device further comprises a removal device, wherein the removal device is fixedly arranged to the material layer, wherein the removal device further comprising a removal surface portion, wherein the removal surface portion is adapted to provide a lower adhesion against a surface compared to the adhesive, wherein the removal surface portion is facing essentially the same direction as the surface portion.

[0014] According to one embodiment, the removal device is integrated with the material layer.

[0015] According to one embodiment, the removal device comprises at least a portion of a layer 13 arranged intermediate the adhesive and the material layer, wherein the layer 13 is arranged to the material layer by a second adhesive layer.

[0016] According to one embodiment, the removal device comprises at least a portion of a layer 14 arranged intermediate the material layer and a further film layer, wherein the layer 14 is arranged to the material layer by a third adhesive layer.

[0017] According to one embodiment, the removal device comprises at least a portion of the respective layers 13 and 14.

[0018] According to one embodiment, the material layer comprises a plurality of separate layers.

[0019] According to one embodiment, the removal device is integrated with at least one of the layers.

[0020] According to one embodiment, the material layer is a foam layer.

[0021] According to one embodiment, the separate layers are separate foam layers.

[0022] According to one embodiment, the removal device is arranged between two separate layers of the material layer.

[0023] According to one embodiment, a protective sheet layer is arranged on the removal surface portion covering a portion of the adhesive on the surface portion.

[0024] According to one embodiment, the removal device comprises a further removal surface portion, wherein the further removal surface portion is facing an opposite direction in relation to the surface portion.

[0025] According to one embodiment, the removal device extends beyond the boundary of the surface portion.

[0026] According to one embodiment, the removal device comprises a bulge of the surface portion.

[0027] According to one embodiment, a portion of the protective layer extends beyond the boundary of the surface portion for facilitating a removal of the protective layer from the material layer.

[0028] According to one embodiment, a portion of the protective layer extends beyond the boundary of the surface portion for facilitating a removal of the protective layer from the material layer, and wherein the removal device extends in a direction parallel to the portion.

[0029] According to one embodiment, the removal device extends in a direction parallel to the portion.

[0030] According to one embodiment, the removal device is covered by the portion of the protective layer, wherein the portion extends further than the removal device.

[0031] According to one embodiment, a portion of the protective layer extends beyond the boundary of the surface portion for facilitating a removal of the protective layer from the material layer, and wherein the removal device extends in a direction perpendicular to the portion.

[0032] According to one embodiment, the removal device extends in a direction perpendicular to the portion.

[0033] According to one embodiment, the material layer is flat.

[0034] According to one embodiment, a layer is arranged intermediate the adhesive and the material layer, wherein the layer is made of a material having a higher cohesion than the material layer.

[0035] According to one embodiment, the adhesive comprises silicone.

[0036] According to one embodiment, the adhesive layer comprising silicone has a thickness of 0,01-0,05 mm, wherein a layer is arranged intermediate the material layer and the adhesive, wherein the layer has a thickness of 0,02-0,15 mm.

[0037] According to one embodiment, the amount of silicone in the adhesive (4) is such that it enables at least a 3 ml injection of water into an ISO-8502-6 BreslePatch attached to a surface, with no visible leakage during a 5- 10 minute period.

[0038] According to one embodiment, the surfaces exclude blasted steel surfaces.

[0039] According to one embodiment, a use of the device for surface sampling according to any of the embodiments described in [0012]-[0038] is provided.

[0040] According to one embodiment, a method of using a device for surface sampling according to any of the embodiments described in [0012]-[0038] is provided, the method comprising:

removing the protective layer to expose the adhesive layer prior to attachment,

attaching the device to a surface,

injecting washing/extraction liquid in the sampling volume during attachment to the surface,

sucking out washing/extraction liquid for retrieval and transferring to a cylinder for further analysis or directly into a microconductometer.

[0041] According to one embodiment, the surface comprises silicone.

[0042] According to one embodiment, a method of manufacturing a device for surface sampling according to any of the embodiments described in [0012]-[0015], [0025]-[0038] is provided, the method comprising:

feeding an elongated material layer, and a protective layer and latex sheet or thin elastomer film arranged on a respective side of the material layer,

forming the sampling volume and the filler device, by punching through the material layer using a punch,

removing the filler device,

applying the latex sheet or thin elastomer film,

forming a circumferential edge portion of the of the material layer by punching through the latex sheet or thin elastomer film and the material layer using a punch for forming a circumferential edge portion of the material layer,

forming the protective layer by punching through the protective layer using either the punch and when forming the circumferential edge portion, or using a further punch for additionally forming a portion 3a, whereby the punching, or at least part of the punching, is carried out outside the circumferential edge portion.

[0043] According to one embodiment, the method further comprising:

- blowing compressed air towards the sampling volume for cleaning the sampling volume 2a after removing the filler device and prior to applying the latex sheet or thin elastomer film.

[0044] According to one embodiment, forming of the sampling volume is carried out using a first punch (7a) and adding a latex sheet or thin elastomer film is carried out before using the punch (7b) for forming the circumferential edge portion.

[0045] According to one embodiment, the punching using the punch for forming the circumferential edge portion, forms at least punching lines (2d₁) and (2d₂) having a first distance there between, and wherein the punching using punch (7c) for forming the portion (3a), forms at least punching lines (3a₁) and (3a₂) having a

second distance there between, wherein the second distance is larger than the first distance at least where the portion (3a) is formed.

[0046] According to one embodiment, forming the portion (3a) is carried out by punching through latex sheet or thin elastomer film, the material layer in addition to the protective layer.

[0047] According to one embodiment, a device for surface sampling is provided manufactured by the method according to any of the embodiments in e.g. [0042]-[0046].

Brief description of drawings

[0048] The invention is now described, by way of example, with reference to the accompanying drawings, in which:

[0049] Figs. 1A-1B shows a perspective view of a device for surface sampling according to one embodiment of the invention.

[0050] Fig. 1B' shows a perspective view of a device for surface sampling according to one embodiment of the invention.

[0051] Figs. 1C-1D shows a perspective view of a device for surface sampling according to one embodiment of the invention.

[0052] Fig. 1D' shows a perspective view of a device for surface sampling according to one embodiment of the invention

[0053] Figs. 2A-2G shows a side views of a device for surface sampling according to various embodiments of the invention.

[0054] Fig. 3 shows a perspective view of a device for surface sampling according to one embodiment.

[0055] Figs. 4A, 4B, 4C, 4D, 4E shows perspective views of a device for surface sampling according to various embodiments of the invention.

[0056] Figs. 4A', 4B', 4C', 4D', 4E' shows perspective views of a device for surface sampling according to various embodiments of the invention.

[0057] Figs. 5A-5B shows methods of manufacturing a device for surface sampling.

Description of embodiments

[0058] In the following, a detailed description of the invention will be given. In the drawing figures, like reference numerals designate identical or corresponding elements throughout the several figures. It will be appreciated that these figures are for illustration only and are not in any way restricting the scope of the invention. According to one embodiment, flat or planar should be understood as something essentially extending in two dimensions. This should not be understood as not having any extension in the third dimension. WO2015/147729 A1 is hereby incorporated by reference in its entirety. WO2018/004446 A1 is hereby incorporated by reference in its entirety. Protection may be sought for features in the referenced documents. As is also described herein, planar or flat is defined as wherein a thickness or height dimension of the device 1 is less than any of the extensions of the device 1, perpendicular to the thickness or height direction, defining the surface area of the device 1. According to one embodiment, the use of underside and upper side throughout the text are used for explanatory purposes only. The use of the device 1 enables it to be attached to surfaces having arbitrary normal directions in the three-dimensional space, wherein these surfaces or normal direction of these surfaces may basically have any direction.

[0059] Figs. 1A-1B shows a perspective view of a device 1 for surface sampling, i.e. whereby a surface can be tested by the aid of chemical analysis, for instance by checking for existing contaminants, substances or particles in the test surface area. Fig. 1A shows the device 1 in a closed state prior to usage and Fig. 1B shows the interior of the device 1. Figs. 1C-1D shows a perspective view of a device for surface sampling according to one embodiment in an analogous manner as in Fig. 1A-1B. In Fig. 1B and 1D, respectively and adhesive 4 is disclosed.

[0060] The device 1 for surface sampling comprises a flat or planar material layer 2 comprising a surface portion 2c and a circumferential edge portion 2d encompassing the surface portion 2c and thus defining a boundary of the surface portion 2c. According to one embodiment, the material layer 2 comprises a foam material. According to one embodiment, the material layer is made of ageing – resistant, flexible material with closed pores, e.g. polyethylene foam. According to one embodiment, the foam material is a double-stick foam material. According to one embodiment, adhesive is arranged on the underside and on the upper side of the material layer 2, wherein a protective sheet 8 is present on the underside and removed to be replaced by a latex sheet 9 or thin elastomer film 9, in a manufacturing step, hereinafter referred to as a film layer 9. According to one embodiment, the flat material layer 2 comprises several layers of double-stick foam are arranged onto each other. According to one embodiment, the flat material layer 2 has a depth of between 0,5-10 mm. According to one embodiment, the flat material layer 2 has a depth of between 0,5-5 mm. According to one embodiment, the device 1 may have a square shape. According to one embodiment, the device 1 may have a rectangular shape. According to another embodiment, the device 1 may have a circular shape. The device 1 may thus have various forms, shapes and dimensions. According to one embodiment, the dimensions/size of the device 1 is a 5x5 cm shaped square. According to one embodiment, the material layer 2 has a thickness of 0,5-10 mm. According to one embodiment, the material layer 2 has a thickness of 0,5-5mm.

[0061] The device 1 for surface sampling further comprises a sampling volume 2a. According to one embodiment, the sampling volume 2a is adapted to comprise a filler device 2b, which essentially fills out the sampling volume 2a prior to use and forms a reinforcement until the device is used. According to one embodiment, the sampling volume 2a is delimited by the material layer 2 and the film layer 9. According to one embodiment, the film layer 9 is replaced by a flexible sleeve body, with a closed end. According to one embodiment, the flexible sleeve body is a flexible sleeve container. According to one embodiment, the flexible sleeve body or container is shaped essentially as a condom. According to one embodiment, the flexible sleeve body or container is shaped essentially as a tubular shape with a

closed end. According to one embodiment, the flexible sleeve body or container is formed by the same material as the film layer 9. Before use of the device 1, the filler device 2b may be removed from the sampling volume 2a, thus creating a recess in the surface portion 2c. According to one embodiment, the filler device 2b is a cut-out of the material 2. According to one embodiment, the cut-out of the material is created during manufacturing of the device 1 in a punching process step. According to one embodiment, the filler device 2b is a separate material compared to the material layer 2. According to one embodiment, the filler device has a round or circular shape. According to one embodiment, the corresponding sampling area of the sampling volume 2a is 12.5 cm². According to one embodiment, the sampling volume has a depth of 0,5-10 mm. According to one embodiment, the sampling volume has a depth of 0,5-5 mm. According to one embodiment, the sampling volume has a depth of 1-2mm. According to one embodiment, the filler device 2b may have various forms, shapes and dimensions to fit various needs. The filler device 2b may for instance be square circular, rectangular, elliptical etc. According to one embodiment, the filler device 2b is removed in the manufacturing process, compare e.g. paragraph [0055] of WO2015/147729 A1 as incorporated by reference, before applying a latex sheet or a thin elastomer film 9. Thus, according to one embodiment, the sampling volume 2a does not comprise a filler device 2b. Thus, according to one embodiment, the sampling volume 2a is devoid of a filler device 2b. According to one embodiment, the filler device 2a is removed mechanically or manually. By providing a device for surface sampling without a filler device 2b, the risk of contamination is further reduced as it will not be required to manually remove the filler device in the field which may cause direct contamination in the sampling volume or reduce the bonding capacity of the adhesive 4, when using dirty hands or gloves, the latter which is preferred in the often dirty industrial environment where tests using the device are carried out. This may be particularly relevant to avoid when using adhesive comprising silicone as further described below, as contamination of the silicone adhesive drastically reduces the bonding force onto a surface comprising an OC-layer. This will provide a device for surface sampling that enable measuring of surface contamination levels with an increased and higher level of accuracy and

precision. Further advantages of providing a device for surface sampling that does not comprise a filler device is a considerably reduced weight as the filler makes up a considerable part of the device, both in weight and volume. There are thus environmental benefits of removing the filler device in relation to transport. Avoiding this removal step during use increases testing speed and safety as well, for tests involving single device or even more advantageously, a plurality of devices. Avoiding waste and waste handling in the use situation is furthermore beneficial, and there is further environmental benefits since this waste does not risk ending up in the environment or in other unwanted places. The filler device will have a side with some adhesive that may easily stick to test surfaces or other places during waste handling of the same. This overcomes a prejudice in the field, as the filler device also has a stabilizing effect or a reinforcement until the device is used. This is explicitly defined in the related standard of these type of surface sampling devices. Thus, the prior art teaches against providing a device for surface sampling that does not comprise a filler device. Surprisingly, the lower weight of the devices make them less inclined to be bent or in other ways affected following the removal of the filler device, since the self weight and weight from other devices during packaging and transport may be the main cause for deformation after manufacturing.

[0062] The device 1 for surface sampling further comprises a protective layer 3 arranged on the surface portion 2c of the material layer 2 by an adhesive 4 arranged on the material layer 2. According to one embodiment, the adhesive 4 is an adhesive layer covering the surface portion 2c. According to one embodiment, the adhesive layer 4 is arranged on the surface portion 2c of the material layer 2 via a tape layer having the adhesive layer 4 on at least one side. According to one embodiment, the tape layer has the adhesive layer 4 on a side facing a surface 15. According to one embodiment, the protective layer 3 is a thin sheet of paper. According to one embodiment, the protective layer 3 is treated, at least on one side preferably the underside 3b, with silicone or other suitable substances or material to more easily be detachable from the adhesive and the material layer 2. According to one embodiment, the protective layer 3 is a siliconized sheet of paper. According to further embodiments, the protective layer 3 is made of a

synthetic material or a synthetic paper. According to one embodiment, the adhesive 4 arranged on the surface portion 2c comprises silicone. According to one embodiment, the adhesive 4 arranged on the surface portion 2c comprises a silicone material. According to one embodiment, an adhesive 4 comprising silicone is also known as Silicone adhesive. According to one embodiment, an adhesive 4 comprising silicone, i.e. a Silicone adhesive is formed using known processes for forming or producing Silicone adhesives. It has been found that such adhesive 4 with silicone makes it possible to use the device 1 for its intended use, and provide sufficient adhesion against surfaces comprising anti-fouling coatings or paint comprising silicone or other types of low-energy surfaces. Such surfaces may also be known as silicone coatings, fouling release coatings or organo silicone surfaces, or OC-surfaces. Notably, any surface that contains mixed paints with an OC-layer is applicable for devices 1 with an adhesive 4 comprising silicone, including damaged surfaces, or spotted surfaces, exposing a mixture of coatings, before reparation and repainting, or following a cleaning and/or blasting of a surface and therefore applicable for the test procedure and use of the device 1. Further, such surfaces also comprises steel surfaces that has previously been painted with silicone based coatings and therefore comprises residues of silicone. According to one embodiment, such anti-fouling coatings or paints comprising silicone or silicone coatings are mainly elastomers based on PDMS, polydimethylsiloxane. According to one embodiment, the adhesive 4 comprising silicone provides sufficient adhesion against a anti-fouling surface or low-energy surface comprising Teflon or silicone treated films or hardened plexi glass or low-energy plastics like Polyethylene, or Polypropylene. However it is been found that the device 1 comprising an adhesive 4 comprising silicone may also work and provide sufficient adhesion against other surfaces which are not low-energy surfaces, but typical and hitherto known surfaces for which the device 1 has been used. It has been found that a device 1 comprising adhesive 4 comprising silicone may also provide sufficient adhesion against any type of paint commonly used in the industrial environment, such as e.g. the ship building or offshore industry. According to one embodiment, when the adhesive 4 comprises silicone, the protective layer 3 comprises a polyester (PET) layer, wherein at least the side of

the protective layer 3 facing the adhesive 4 comprises a layer or coating of fluorocarbon. The layer of fluorocarbon provides for a facilitated removal of the protective layer 3 from the adhesive 4 on surface portion 2c of the material layer 2. Using a silicone treated protective sheet layer 3 would create an undesirably strong bond between the protective sheet layer 3 and the adhesive 4 which makes removal too difficult. According to one embodiment, both sides of the protective layer 3 comprises a fluorocarbon layer or coating. According to one embodiment, the protective layer 3 comprises a paper layer laminated to the PET layer on the side opposite the side facing the adhesive 4. According to one embodiment, the paper layer is laminated to the side of the PET layer with no fluorocarbon layer. According to one embodiment, the paper layer is laminated using an acrylic adhesive arranged on the paper layer facing the PET layer. According to one embodiment, the paper layer has been treated to provide a wet strength. According to one embodiment, the paper layer has been treated to provide a high wet strength. According to one embodiment, the wet strength is at least 10-15% of the dry strength of the paper. According to one embodiment, the paper layer is configured to be printed on. As such, the layer 13 provides for indicating the product type, number or brand to facilitate the correct and intended product for a given situation or use. No printing may be carried out directly on the PET layer, as these are not configured for being printed on.

[0063] There are substantial cost and environmental benefits of a device 1 comprising an adhesive 4 comprising silicone that can be used on a wider range of surfaces. Both from a manufacturing perspective where fewer variants and necessary tools and processes are needed. But also from the use perspective. The device 1 has a best-before date and a larger area of use in terms of surfaces will reduce waste and scrapping. Furthermore, devices 1 as outlined throughout this description comprising an adhesive 4 comprising silicone may be allowed to be adhered longer periods on a surface 15 without increasing the risk of leaving residues which is normally the case. Thus, the adhesive 4 with silicone facilitates removal of the device 1 from the surface also after a longer time than normal, which increases the areas of use for the device 1 as it may be used on surfaces more challenging to test or facilitates work processes.

[0064] According to one embodiment of the device 1 for surface sampling, as shown in Fig. 1A-1B, the protective layer 3 is essentially formed in the same shape as the surface portion 2c of the material layer. According to one embodiment, the protective layer 3 is formed in the same shape as the surface portion 2c of the material layer. According to one embodiment, the protective layer 3 covers the surface portion 2c, wherein no portion extends beyond the boundary of the surface portion 2c. According to one embodiment, as shown in Fig. 1B', a similar device as in Fig. 1A-1B is shown, with the difference that the sampling volume 2a does not comprise a filler device 2b. According to one embodiment the sampling volume 2a does not comprise a filler device 2b when the protective layer 3 is arranged on the surface portion 2c of the material layer 2 by an adhesive 4 arranged on the material layer 2. Thus, after removal of the protective layer, the device is devoid of a filler device 2b. According one embodiment, the filler device 2b has been removed from the sampling volume during manufacturing. According to one embodiment of the device 1, for surface sampling, as shown in Figs. 1C-1D, a portion 3a of the protective layer 3 extends beyond the boundary of the surface portion 2c for facilitating a removal of the protective layer 3 from the material layer 2. A person aiming to remove the protection layer may more easily grasp the portion 3a extending beyond the surface portion 2a and pull off the protective layer 3 from the material layer 2. According to one embodiment, the shape of the portion 3a may be rounded as in Fig. 1C or have other geometrical shapes, and extend beyond the boundary of the surface portion 2c to a varying extent. According to one embodiment, the portion 3a extends by 1%-50% of the total length or diameter of the device 1, beyond the boundary of the surface portion 2c, in the same or a parallel direction as the extension of the portion 3a. According to one embodiment, the portion 3a extends by 0,5-25 mm beyond the boundary of the surface portion 2c. According to one embodiment, the largest extension of the portion 3a in a direction opposite to the extension beyond the boundary is between 10%-100% of the length of the device 1 in a direction parallel to the extension in this direction. According to one embodiment, a certain portion of the protective layer 3 directly above the filler device 2b may not be siliconized or treated by any other means to more easily detach from the adhesive. Therefore when a user pulls the portion 3a

the protective layer 3 will be removed to expose the adhesive 4 prior to attaching the device 1 for sampling, and at the same time remove the filler device 2b from the sampling volume 2a which will thus stick to the protective layer 3. Thus, no direct contact of a human to the filler or sampling volume 2a is needed during removal for the filler device 2b which reduces the risk of contaminating the sampling volume 2a. According to one embodiment, as shown in Fig. 1D', a similar device as in Fig. 1C-1D is shown, with the difference that the sampling volume 2a does not comprise a filler device 2b. According to one embodiment the sampling volume 2a does not comprise a filler device 2b when the protective layer 3 is arranged on the surface portion 2c of the material layer 2 by an adhesive 4 arranged on the material layer 2. Thus, after removal of the protective layer, the device is devoid of a filler device 2b. According one embodiment, the filler device 2b has been removed from the sampling volume during manufacturing.

[0065] Fig. 2A discloses a side view of a device for surface sampling arranged on a surface 15, comprising a flat material layer 2 comprising a surface portion 2c and a circumferential edge portion 2d defining the boundary of the surface portion 2c, further comprising a sampling volume 2a, wherein the sampling volume 2a is adapted to comprise a filler device 2b for filling out the sampling volume 2a. A protective layer 3 is arranged on the surface portion 2c of the material layer 2 by an adhesive 4 arranged on the surface portion 2c of the material layer 2, wherein the device 1 further comprises a removal device 12, wherein the removal device 12 is rigidly arranged to the material layer 2, wherein the removal device 12 further comprising a removal surface portion 12a, wherein the removal surface portion 12a is adapted to provide a lower adhesion against a surface 15 compared to the adhesive 4, wherein the removal surface portion 12a is facing essentially the same direction as the surface portion 2c. According to one embodiment, the removal surface portion 12a is facing the same direction as the surface portion 2c. According to one embodiment, by essentially facing the same direction, the removal surface portion 12a would abut or bear against the surface 15 during a test or surface sampling procedure using the device 1. According to one embodiment, this reflects the removal surface portion 12a as described throughout the description. According to one embodiment, Figs. 2A-2G, discloses a slightly

bent removal portion 12 in relation to the rest of device 1, which bending primarily aims to facilitate for the reader the identification of the respective removal portions 12 and what they comprise. According to one embodiment, a slightly bent removal portion 12 is still considered to comprise a removal surface portion 12a essentially facing the same direction as the surface portion 2c. According to one embodiment, that the removal surface portion 12a is facing essentially the same direction as the surface portion 2c provides that the normal direction of the removal surface portion 12a within 45° from the normal direction of the surface portion 2c. According to one embodiment, that the removal surface portion 12a is facing essentially the same direction as the surface portion 2c provides that the normal direction of the removal surface portion 12a within 20° from the normal direction of the surface portion 2c.

[0066] According to one embodiment, being rigidly arranged to the material layer 2 provides that they, e.g. the removal device 12 and the material layer 2 may both be composed of the same material, or composed of separate materials rigidly or fixedly attached to each other. According to one embodiment, being composed of the same material provides that they are integrated. According to one embodiment, rigidly arranging the removal device 12 to the material layer provides that normal pulling of the removal device in normal conditions, i.e. in a common test situation, will not cause separation of the same or residues of the material layer on the test surface. According to one embodiment, rigidly arranging corresponds to fixedly arranging, or rigidly fixing two portions to each other, i.e. wherein two portions such as the removal portion and the material layer are fixedly held together and are adapted to be held together during normal use and removal of the device 1. According to one embodiment, rigidly or fixedly arranging the removal device 12 to the material layer 2 means that they are adapted to be held together during normal use sufficiently to avoid leakage e.g. between the material layer 2 and the removal device 12 of e.g. washing/extracting liquid injected in the sampling volume. According to one embodiment, the material layer 2 and the removal device 12 have similar cohesion properties. According to one embodiment, the removal device 12 has higher cohesion properties than the material layer 2. According to one embodiment, described herein, the removal

surface portion 12a is a surface portion wherein less or no adhesive 4 is arranged on the material layer 2. According to one embodiment, the removal surface portion 12a is provided with a protective sheet layer 12a' covering a portion of the adhesive 4 on the surface portion 2c. According to such embodiment, the removal device 12 is integrated with the material layer 2. This enables a user to get a better grip as well as an advantageous pulling angle of the device 1 in relation to the surface during removal of the same from the surface, wherein removal of the device is facilitated. According to one embodiment, a portion 3a of the protective layer 3 is provided that extends beyond the boundary of the surface portion 2c for facilitating removal of the protective layer 3 from the material layer 2. According to one embodiment, a layer 13 as will be further described below, is arranged intermediate the material layer 2 and the adhesive 4. According to one embodiment, the layer 13 is arranged intermediate the adhesive 4 and a second adhesive layer 4' as described below. According to one embodiment, the tape layer as outlined above, forms the layer 13. According to one embodiment, the layer 13 is formed by DuploCOLL® 30012, by Lohmann, or similar tapes. According to one embodiment, the layer 13 is formed by 3M™ Polyester Tape 8403, by 3M, or similar tapes. These tapes have a silicone adhesive on a side, that in the use in the present device 1 for surface sampling is arranged to face the sampling surface 15. According to one embodiment, the layer 13 is formed by Polyester (PET). According to one embodiment, the layer 13 is a PET carrier for carrying the silicone adhesive. According to one embodiment, the layer 13 preferably has a thickness of 0,02 mm-0,15 mm. According to one embodiment, the layer 13 has a thickness of 0,04 mm-0,10 mm. According to one embodiment, the layer 13 has a thickness of 0,04 mm. According to one embodiment, the layer 13 has a thickness of 0,10 mm. According to one embodiment, the adhesive 4 comprising silicone has a thickness of 0,01-0,05 mm. According to one embodiment, the adhesive layer 4 comprising silicone has a thickness of 0,01-0,05 mm. More preferably, the adhesive comprising silicone has a thickness of 0,02-0,03 mm. More preferably, the adhesive layer 4 comprising silicone has a thickness of 0,02-0,03 mm. According to one embodiment, the adhesive 4 comprising silicone has a weight of 15-35 g/m². According to one embodiment, the

adhesive layer 4 comprising silicone has a weight of 15-35 g/m². According to one embodiment, the layer 13 has a sufficient thickness and cohesion and reduced flexibility, i.e. a certain hardness, to reduce the risk of silicone contamination on a test surface, i.e. a contamination where the device 1 and adhesive 4 comprising silicone material itself leaves silicone residues on a surface 15 and prevents or makes harder e.g. by cleaning, later repainting on this surface. An adhesive 4 comprising silicone arranged directly on the surface portion 2c of the material layer or on a too thin layer 13 of low cohesion with high flexibility and low hardness, may increase the risk of silicone contamination on certain surfaces, e.g. uneven surfaces or blasted surfaces. The same applies if the adhesive layer 4 comprising silicone has a too high thickness, in such cases the risk of silicone contamination may increase. According to one embodiment, the layer 13 reinforces the device and provides further stability of the same, which is particularly advantageous when the filler device 2b has been removed from the sampling volume 2a.

[0067] Fig. 2B discloses a side view of one embodiment of a device for surface sampling arranged on a surface 15, according to the invention, wherein the removal device 12 and removal surface portion 12a comprises at least a portion of layer 13 arranged intermediate the adhesive 4 and the material layer 2, wherein the layer 13 is arranged to the material layer 2 by a second adhesive layer 4'. According to one embodiment the adhesive layer 4' provides that the layer 13 is rigidly arranged to the material layer 2. According to one embodiment, the removal portion 12 comprises a further removal surface portion 12b adapted to provide a lower adhesion against a surface, such as e.g. a human hand or finger, compared to the adhesive 4, or 4'. According to one embodiment the further removal surface portion 12b is facing an opposite direction in relation to the removal surface portion 12a and surface portion 2c. According to one embodiment, the removal surface portion 12a is provided with a protective sheet layer 12a' covering a portion of the adhesive 4 on the surface portion 2c. According to one embodiment, the further removal surface portion 12b is provided with a further protective sheet layer 12b' covering a portion of the adhesive 4' between the layer 13 and the material layer 2. Thus, according to one embodiment, the removal device 12 is rigidly arranged to the material layer 2 wherein the removal device further comprises a removal

surface portion 12a and a removal surface portion 12a is adapted to provide a lower adhesion against a surface 15 compared to the adhesive 4 wherein the removal surface portion 12a is facing essentially the same direction as the surface portion 2c.

[0068] Fig. 2C discloses a side view of one embodiment of the present invention, arranged on a surface 15 wherein the removal device 12 comprises the material layer 2. According to one embodiment, the removal device 12 is integrated with the material layer 2. According to one embodiment, the removal device 12 is integrated with the material layer 2 and the portion of a layer 13 arranged intermediate the adhesive layer 4 and the material layer 2, wherein the layer 13 is arranged to the material layer 2 by a second adhesive layer 4'. According to one embodiment, as described in connection with Fig. 2B, the removal device 12 comprises a removal surface portion 12a and a removal surface portion 12b.

[0069] Fig. 2D discloses a side view of one embodiment of the present invention, arranged on a surface 15, wherein the material layer 2 comprises a plurality of separate layers 2.1, 2.2, in this case two separate layers 2.1, 2.2. The removal device 12 is integrated with the two layers 2.1, 2.2 of the material layer 2. According to one embodiment, as disclosed in Fig. 2D, the removal device 12 comprises a removal surface portion 12a is a non-adhesive or lower adhesive portion, adapted to provide a lower adhesion against a surface compared to the adhesive 4, wherein the removal surface portion 12a is facing essentially the same direction as the surface portion 2c, i.e. a direction that essentially would face the surface 15 or about the surface 15 when surface sampling test is carried out.

[0070] Fig. 2E discloses a side view of one embodiment of the present invention, arranged on a surface 15, wherein the removal device 12 comprises at least a portion of a layer 14 arranged intermediate the material layer 2 and a further film layer 9, wherein the layer 14 is arranged to the material layer 2 by a third adhesive layer 4". According to one embodiment, disclosed herein, the material layer comprises a plurality of separate layers 2.1, 2.2, in this case two

separate layers 2.1, 2.2. The removal device 12 is integrated with the two layers 2.1, 2.2 of the material layer 2.

[0071] Fig. 2F discloses a side view of one embodiment of the present invention, arranged on a surface 15, wherein the removal device is integrated with at least one of the layers 2.1, 2.2, 2.3, i.e. in this case, two layers 2.1 and 2.3 wherein one layer 2.2 is arranged there between. According to one embodiment, the respective layers 2.1 and 2.2 is replaced by the layers 14 and 13 respectively. Thus, according to one embodiment, the removal device 12 comprises at least a portion of the respective layers 13 and 14. According to one embodiment, as described herein, the film layer 9 is shaped and adapted to cover and being arranged to the removal device 12, by extending over and covering the further removal portion 12b and being arranged to the same. According to one embodiment, the removal device 12 thereby becomes more rigid.

[0072] Fig. 2G discloses a side view of one embodiment of the present invention, arranged on a surface 15, wherein the removal device is integrated with at least one of the layers 2.1, 2.2, 2.3. According to one embodiment, this layer comprises layer 2.2, arranged intermediate the layers 2.1 and 2.3. According to one embodiment, the layer 2.2 is replaced by a similar layer as 13 or 14, thus not forming part of the material layer 2.

[0073] Fig. 3, discloses a perspective view of the present invention according to one embodiment. Herein, the protective layer 3 has been removed. Herein, a removal device 12 is rigidly arranged to the material layer 2 by being arranged between two layers 2.1 and 2.2 of the material layer 2. According to one embodiment, an adhesive layer is arranged between layers 2.1, 2.2. According to one embodiment, a first adhesive layer is arranged on the layer 2.1, and a second adhesive layer is arranged on the layer 2.2, wherein both adhesive layers are facing the removal device 12. According to one embodiment, the layers are laminated together.

[0074] Fig. 4A discloses a perspective view of the present invention according to one embodiment. Herein a protective layer 3 is arranged on the surface portion 2c

of the material layer 2. According to the embodiment herein, a portion 3a of the protective layer 3 extends beyond the boundary of the surface portion 2c for facilitating removal of the protective layer 3 from the material layer 2. According to one embodiment, disclosed herein, the removal device 12 comprises a bulge of the surface portion 2c. According to one embodiment, as seen herein, the removal device 12 extends in a direction perpendicular to the portion 3a. According to one embodiment, the removal device 12 comprises a bulge of the boundary of the surface portion 2c. According to one embodiment, if the device 1 has a square or rectangular shape, the removal device 12 extends in a direction essentially parallel to the apex of one of the corners. This may facilitate removal of the device 1 from the surface as the pulling of the device 1 is initiated where the surface portion 2c has pointy shape. According to one embodiment, the removal device 12 extends with an angle in relation to the portion 3a that between 0° and 180° . According to one embodiment, as shown in Fig. 4A', a similar device as in Fig. 4A is shown, with the difference that the sampling volume 2a does not comprise a filler device 2b. According to one embodiment the sampling volume 2a does not comprise a filler device 2b when the protective layer 3 is arranged on the surface portion 2c of the material layer 2 by an adhesive 4 arranged on the material layer 2. Thus, after removal of the protective layer, the device is devoid of a filler device 2b. According one embodiment, the filler device 2b has been removed from the sampling volume during manufacturing.

[0075] Fig. 4B discloses a perspective view of the present invention according to one embodiment, wherein the removal device 12 extends in a direction parallel to the portion 3a. According to one embodiment a parallel direction comprises an embodiment, wherein the removal device extends in an opposite direction in relation to the portion 3a. According to one embodiment, as shown in Fig. 4B', a similar device as in Fig. 4B is shown, with the difference that the sampling volume 2a does not comprise a filler device 2b. According to one embodiment the sampling volume 2a does not comprise a filler device 2b when the protective layer 3 is arranged on the surface portion 2c of the material layer 2 by an adhesive 4 arranged on the material layer 2. Thus, after removal of the protective layer, the

device is devoid of a filler device 2b. According one embodiment, the filler device 2b has been removed from the sampling volume during manufacturing.

[0076] Fig. 4C discloses a perspective view of the present invention according to one embodiment. In this embodiment, the removal device 12 is covered by the portion 3a of the protective layer 3. According to one embodiment, the portion 3a extends further than the removal device 12. One advantage is that it facilitates the removal of the protective layer before use as the pulling forces are essentially opposing each other at a given point. One advantage of this embodiment is that packing space requirement is reduced for the device comprising both a removal device and a portion 3a at the same time as the facilitated removal of the protective layer 3 is maintained. According to one embodiment, as shown in Fig. 4C', a similar device as in Fig. 4C is shown, with the difference that the sampling volume 2a does not comprise a filler device 2b. According to one embodiment the sampling volume 2a does not comprise a filler device 2b when the protective layer 3 is arranged on the surface portion 2c of the material layer 2 by an adhesive 4 arranged on the material layer 2. Thus, after removal of the protective layer, the device is devoid of a filler device 2b. According one embodiment, the filler device 2b has been removed from the sampling volume during manufacturing.

[0077] Fig. 4D discloses a perspective view of the present invention according to one embodiment. In this embodiment, the removal device 12 is covered by the portion 3a of the protective layer, and the portion 3a extends further than the removal device 12 in a direction along or parallel to the circumferential edge portion 2d. According to one embodiment, the portion 3a extends further than the removal device 12. According to one embodiment, the portion 3a is arranged at a corner of the device 1. According to one embodiment, the removal device 12 is arranged between the corner of the device 1 and the center point between two corners of the circumferential edge 2d. According to one embodiment, the removal device 12 and removal surface portion 12a comprises at least a portion of layer 13 arranged intermediate the adhesive 4 and the material layer 4 similar to what is

described with respect to Fig. 2B. As described herein, according to one embodiment, the removal surface portion 12a is provided with a protective sheet layer 12a' covering a portion of the adhesive 4 on the surface portion 2c. According to one embodiment, the protective sheet layer 12a' is made of high density polyethylene (HDPE). According to one embodiment, the protective sheet layer 12a' is a HDPE foil. According to one embodiment, the opposite side of the protective sheet layer 12a', not facing the adhesive 4, is silicone treated, wherein the protective layer 3 may be easily removed from the protective sheet layer 12a'. According to one embodiment, the, the opposite side of the protective sheet layer 12a', not facing the adhesive 4, is untreated. According to one embodiment, the further removal surface portion 12b is provided with a further protective sheet layer 12b' covering a portion of the adhesive 4' between the layer 13 and the material layer 2. According to one embodiment, the protective sheet layer 12b' is made of high density polyethylene (HDPE). According to one embodiment, the protective sheet layer 12b' is a HDPE foil. According to one embodiment, as shown in Fig. 4D', a similar device as in Fig. 4D is shown, with the difference that the sampling volume 2a does not comprise a filler device 2b. According to one embodiment the sampling volume 2a does not comprise a filler device 2b when the protective layer 3 is arranged on the surface portion 2c of the material layer 2 by an adhesive 4 arranged on the material layer 2. Thus, after removal of the protective layer, the device is devoid of a filler device 2b. According one embodiment, the filler device 2b has been removed from the sampling volume during manufacturing.

[0078] Fig. 4E discloses a perspective view of the present invention according to one embodiment, wherein the portion 3a extends further than the removal device 12 and wherein the portion 3a and the removal device are parallel but offset, i.e. there is no overlap or covering of the removal device 12. According to one embodiment, the portion 3a partly covers the removal device 12. According to this embodiment, the advantage of a reduced packing space is maintained wherein the further advantage of a facilitated removal is present as well, both described above. According to one embodiment, as shown in Fig. 4E', a similar device as in Fig. 4E is shown, with the difference that the sampling volume 2a does not comprise a filler device 2b. According to one embodiment the sampling volume 2a does not

comprise a filler device 2b when the protective layer 3 is arranged on the surface portion 2c of the material layer 2 by an adhesive 4 arranged on the material layer 2. Thus, after removal of the protective layer, the device is devoid of a filler device 2b. According one embodiment, the filler device 2b has been removed from the sampling volume during manufacturing.

[0079] Using the device 1 for surface sampling, may be carried out according to the following steps. A user looks for a suitable surface 15 on which the test can be made. The surface 15 can for instance be horizontal, vertical, slanted or somewhat concave. The user removes the protective layer 3 by grasping the portion 3a or the gripping device 5, 6 and pulling it off the material layer 2. According to one embodiment, the filler device 2b is thereby automatically removed from the sampling volume 2a. In other embodiments, the filler device 2b is removed by hand/manually. The device 1 is thereafter pressed with the exposed surface portion 2c having adhesive 4 onto a selected test surface. The device 1 is fixed on the surface by firmly pressing with the finger tips onto the device 1. A syringe (now shown) is thereafter filled with e.g. approx. 1-2 ml of washing/extracting liquid determined by the final analysis that is to be performed. The washing/extracting liquid is thereafter injected into the sampling volume 2a by piercing the syringe needle through the body of the device 1 into the sampling volume 2a of the device 1 and injecting the content of the syringe. According to one embodiment, the washing/extracting liquid is water. According to one embodiment, the washing/extracting liquid is an acid. According to one embodiment, the washing/extracting liquid is a basic solution. According to one embodiment, the washing/extracting liquid is an organic solvent. If necessary, the needle can be bent to get a convenient angle. Thereafter, a part of the liquid is sucked out from the sampling volume 2a and reintroduced into the sampling volume 2a while maintaining the needle inserted. This will produce turbulence which improves the dissolution of the contaminants, particles and substances. This may be repeated a number of times or alternatively, the device 1 may be carefully rubbed especially when the sample is bound in a thick layer of contaminants. Finally, according to one embodiment and procedure as much as possible of the content in the sampling volume 2a is sucked out and retrieved and transferred to a cylinder (not

shown) for further analysis, or directly into a microconductometer. For even higher accuracy, the injection and turbulence creation parts may be carried out repeatedly. After use, the device 1 needs to be removed from the surface. The user grasps the removal device 12 and pulls the removal device 12 and device 1 in order to overcome the adhesive forces and remove the device 1. According to one embodiment, the user pulls the removal device in a direction perpendicular to the surface, i.e. parallel to the normal direction of the surface, According to one embodiment, the user pulls the removal device in a direction having an angle to the surface, i.e. wherein this direction is non-perpendicular to the surface 15. Preferably, a slow and controlled movement is used to prevent residuals of the device on the surface.

[0080] According to one embodiment, the lower adhesion is caused by lower adhesive forces between the removal surface portion and the surface, i.e. test surface for sampling. According to one embodiment, the lower adhesive forces are provided by lower adsorption and/or dispersive adhesion, caused by factors including but not limited to lower electrostatic van der Waals forces between molecules on the removal surface portion 12a and molecules on the test surface. According to one embodiment, the lower adhesive forces are provided by reduced diffusion, or diffusive adhesion between the removal surface portion and the surface. According to one embodiment, the lower adhesive forces are provided by reduced chemical adhesion between the removal surface portion 12a and the surface. In one embodiment the lower adhesive forces are provided by any combination of two or more of the above mentioned factors. According to one embodiment, the removal surface portion 12a is provided with an adhesive which provides a weaker adhesion on the surface than the adhesive 4 of the surface portion 2c. This enhances the ability to grasping the removal device 12. According to one embodiment, the removal surface portion 12a is a non-adhesive portion. According to one embodiment, the non-adhesive portion is provided by the protective sheet layer 12a', 12b'. In one embodiment, the removal surface portion 12a lacks an adhesive layer which provides the lower adhesion compared to the adhesive 4. According to one embodiment, the further removal surface portion 12b lacks an adhesive layer. According to one embodiment, lower adhesion of the

removal surface portion 12a, is carried out by applying a solvent on the adhesive 4 prior to applying the protective layer 3. According to one embodiment, lower adhesion of the removal surface portion 12a, is carried out by applying an adhesive removing solvent or an adhesive protective compound or chemicals or other kinds of treatment such as e.g. temperature, UV etc. This may cause the strength of the adhesive forces of the adhesive against a surface to be reduced or even entirely removing the adhesive 4.

[0081] According to one embodiment, the lower adhesion provides that the removal force, RF_{RSP} , or peel adhesion, required to remove the removal surface portion 12a from the surface is $RF_{RSP} \leq 0.9 * RF_{ADH}$, wherein RF_{ADH} is the removal force, or peel adhesion, required to remove the surface portion 2c carrying adhesive (4). According to one embodiment, $RF_{RSP} \leq 0.75 * RF_{ADH}$. According to one embodiment, $RF_{RSP} \leq 0.5 * RF_{ADH}$. According to one embodiment, $RF_{RSP} \leq 0.25 * RF_{ADH}$. According to one embodiment, $RF_{RSP} \leq 0.1 * RF_{ADH}$.

[0082] According to one embodiment, the surface 15 is a test surface for the device for surface sampling. According to one embodiment, the surface is a steel surface. According to one embodiment, the surface is a blasted steel surface, steel plate surface or steel sheet surface. According to one embodiment, the described surfaces 15 are low energy surfaces. According to one embodiment, the surface is a surface with low surface energy. According to one embodiment, the surface comprises silicone. According to one embodiment, the silicone may be in the form of a coating or paint. According to one embodiment, the silicone is residues from e.g. coating or paint.

[0083] According to one embodiment, the layer 13 and layer 14 are made of a material having a higher cohesion than the material layer 2. According to one embodiment, the layers are thereby less susceptible to being damaged and leaving residues of the material layer 2 or the layer 13 and 14 against a surface 15. In one embodiment, the layer 13 is a tape layer. In one embodiment, the layer 14 is a tape layer. According to one embodiment, the layer 13 is a first layer and the layer 14 is a second layer. According to one embodiment, the layer 13 is a first

pull layer 13 and the layer 14 is a second pull layer 14. According to one embodiment, the layer 13 is a first tape layer 13 and the layer 14 is a second tape layer 14. According to one embodiment, the layer 13 is a first layer 13 and the layer 14 is a second layer 14 when the layers are both provided in the same device 1. According to one embodiment, the material layer 2 is a foam layer. According to one embodiment, the separate layers 2.1, 2.2, 2.3 are separate foam layers.

[0084] According to one embodiment, the film layer 9 is shaped to cover and being arranged to the removal device 12, by extending over and covering the further removal surface portion 12b and being arranged to the same. According to this embodiment, the removal device 12 becomes even more rigid.

[0085] According to one embodiment, the device 1 is adapted to have a larger tensile strength in a first direction than in a second direction. According to one embodiment, the larger tensile strength in one direction enables a better ability to withstand higher pulling forces acting on the removal device 12 without breaking, whereas the lower tensile strength in the second direction enables a relatively more flexible material against the test surface. The latter enables a better ability to stick and seal to an uneven or rough test surface. According to one embodiment, the material layer 2 is adapted to have a larger tensile strength in a first direction than in a second direction. According to one embodiment, the first direction is perpendicular to the second direction. According to one embodiment, the first direction is parallel to the extension direction of the removal device 12. According to one embodiment, the first direction extends at an angle between 0-90° in relation to the second direction. According to one embodiment, the first direction is perpendicular to the extension direction of the removal device.

[0086] According to one embodiment, the device 1 is configured to be attached to a surface 15 by removal of the protective layer 3 to expose the adhesive layer 4 prior to attachment.

[0087] According to one embodiment, the device 1 is configured to be attached to a surface 15 by removal of the protective layer 3 to expose the adhesive layer 4 prior to attachment to the surface 15.

[0088] According to one embodiment, the device 1 is configured to receive washing/extraction liquid in the sampling volume 2a during attachment to the surface 15. According to one embodiment, attachment means the state of attachment between the device 1 and the surface 15.

[0089] According to one embodiment, a device 1 for surface sampling is provided, comprising:

a material layer 2 comprising a surface portion 2c and a circumferential edge portion 2d defining the boundary of the surface portion 2c, further comprising a sampling volume 2a, wherein the sampling volume 2a is adapted to comprise a filler device 2b for filling out the sampling volume 2a,

a protective layer 3 arranged on the surface portion 2c of the material layer 2 by an adhesive 4 arranged on the surface portion 2c of the material layer 2,

wherein the device 1 is configured to be attached to a surface 15 by removal of the protective layer 3 to expose the adhesive layer 4 prior to attachment, wherein the device 1 is further configured to receive washing/extraction liquid in the sampling volume 2a during attachment to the surface 15

characterized in that the device 1 further comprises a removal device 12, wherein the removal device 12 is fixedly arranged to the material layer 2, wherein the removal device 12 further comprising a removal surface portion 12a, wherein the removal surface portion 12a is adapted to provide a lower adhesion against a surface compared to the adhesive 4, wherein the removal surface portion 12a is facing essentially the same direction as the surface portion 2c.

[0090] Fig. 5A shows a method of manufacturing the device 1, e.g. a device according to Fig. 1C, 1D, 1D'. However as explained below the same method may be applied with modifications to manufacturing a device 1 at least according to Fig.

1A, 1B, 1B', Fig.4A-4E'. According to one embodiment, the method is carried out by a feeding elongated variants of the components, i.e. parts 2, 3, 9, of the device 1 to be formed into the device 1, but also part 8, and use rolls 10a, 10a', 10b, 10c, 10c', 10c'', 10d, 10d'' for applying and/or removing at least some of the parts, 3, 8, 9, 13, 16, thus forming different layers, and use punches 7a, 7b, 7c, e.g. a first punch 7a, a second or further or edge portion forming punch 7b, and a third or yet another or further punch 7c for punching through the parts, 2, 3, 8, 9, in a manner wherein the device 1 is formed. In Fig. 5A, the parts 2, 3, 9 to be formed into the device 1 is heavily enlarged in relation to the rolls and punches to better explain the method/process.

[0091] In Fig. 5A, an elongated material layer 2 or elongated variant of the material layer 2 is fed in a left direction as seen in Fig. 5A. According to one embodiment, a liner in the form of a protective sheet 8 is arranged along the elongated material layer 2, wherein an adhesive layer is present between the material layer 2 and the protective sheet 8. An arrow shows the feeding direction as well as the direction of rotation of the rolls and punches. According to one embodiment, feeding is carried out by using a conveyor belt (not shown). According to one embodiment, feeding is carried out using a synchronized movement between the moving parts comprising the rolls and punches. According to one embodiment, feeding and punching is carried out by the aid of opposing punches to the one disclosed in Fig. 5A (not shown). According to one embodiment, the method further comprises removing liner 11 by using a first roll 10a configured to remove a liner 11, wherein the surface portion 2c of the material layer 2 and an adhesive layer thereon is exposed. According to one embodiment, the method further comprises applying a protective layer 3 onto the adhesive layer using a second roll 10b on the side of the material layer opposite the protective sheet 8, i.e. on the side where the liner 11 has been removed. According to one embodiment, a layer 13 is applied on the adhesive layer on the material layer 2 using a further roll 10a' (not shown), prior to applying the protective layer 3. In this case, the outer surface of the layer 13 is applied with another adhesive layer 4, and the adhesive layer on the material layer 2 is the second adhesive layer 4'. According to one embodiment, the method further comprises forming the cut-out of

the material 2, i.e. forming the sampling volume 2a and the filler device 2b, by punching through the material layer 2, and potentially through the protective sheet 8 if present, however not through any additional layer such as any applied protective layer 3, i.e. the protective layer remains un-punched. According to one embodiment, forming the sampling volume 2a and the filler device 2b is carried out before applying the protective sheet 3. Punching is carried out using a punch 7a forming punching lines or cuts 2a₁, 2a₂. The limited tolerances allowed puts a high requirement in terms of exactness in the forming of the punch and punching portions thereon as well as entire process arrangement. According to one embodiment, the method further comprises removing the protective sheet 8 using a roll 10c. According to one embodiment, the protective sheet 8 remains on the adhesive layer/material layer 2 at portions covering the sampling volume 2a. According to one embodiment, the method further comprises applying a latex sheet or thin elastomer film 9 on the same side of the material layer 2 at which the protective sheet 8 was removed. The remaining protective sheet 8 thus prevents a direct contact between the latex sheet or thin elastomer film and the adhesive layer which enables the removing of the filler device 2b from the sampling volume 2a. According to one embodiment, the method further comprises forming a circumferential edge portion 2d of the material layer by punching through the latex sheet or thin elastomer film and the material layer 2 using a second or further punch 7b, thus forming punching lines or cuts 2d₁ and 2d₂. In this step, punching is not carried out through the protective layer 3. Hence the protective layer 3 remains un-punched. The fact that only a part of the layers are cut and thus the limited tolerances thereby allowed puts a high requirement in terms of exactness in the forming of the punch and punching portions thereon as well as entire process arrangement. This is especially true since the punch 7b punches through different materials having different characteristics. Of particular difficulty is to punch through the thin and sensitive latex sheet or elastomer film which requires a sharp punching portion, further through the material layer, and which at the same time does not punch through the protective layer 3 in this step. According to one embodiment, a further roll 10e (not shown) is arranged between punches 7b and 7c, for removing any spill or waste between the forming devices 1 and to facilitate

a next punching step wherein the portion 3a is formed. The removed waste is shown by the dotted line in Fig. 5A. According to one embodiment, the waste between the forming devices 1 is left between the forming devices 1. According to one embodiment, the method further comprises forming a portion 3a of the protective layer by punching through the protective layer 3 using a yet a further punch 7c, forming at least punching line or cut 3a₁ whereby the punching, or at least a part of the punching when only the portion 3a extends beyond the boundary of the surface portion or extending from the circumferential edge portion 2d, is carried out outside the circumferential edge portion 2d previously formed. According to one embodiment, outside in relation to another portion or punching line is defined as further away from a central portion of the device 1 to be shaped. According to one embodiment, outside in relation to another portion or punching line is defined as further away from a position or central line arranged at a center between the punching lines 2d₁ and 2d₂. According to one embodiment, punching is carried out outside at least a portion of the circumferential edge portion 2d, e.g. if the device 1 is to be shaped as a circle, or at least outside a portion of one edge portion 2d if the device 1 is to be shaped in a rectangular or square. According to one embodiment, a punching line or cut 3a₂ is formed essentially through the existing punching line 2d₂ or at least in a close proximity to this punching line. According to one embodiment, forming the portion 3a is carried out by punching through latex sheet or thin elastomer film 9, the material layer 2 in addition to the protective layer 3 as described above. According to one embodiment, in the method of manufacturing a device according to Fig. 1A, 1B, 1B', the punching using punch 7b may be allowed to punch through the protective layer 3 and not using a further punch 7c. Thus, according to one embodiment, the protective layer 3 is formed in the same shape as the surface portion 2c of the material layer. According to one embodiment, in the method of manufacturing a device according to Fig. 1A, 1B, 1B' the further punch 7c is used however according to any manner as described below or throughout this description. According to one embodiment, in the method of manufacturing a device 1 according to at least Fig. 4C, 4C', 4D, 4D', the removal portion 12 is shaped using punch 7b, which is further configured to initially shape a corresponding portion to that of portion 3a also in the material

layer including shaping the portion 3a, as well as in layer 13 that has been applied. Further, according to one embodiment, the punch 7c is selected to not punch through the removal portion 12, however punches through the material layer 2 to expose the portion 3a in this area. According to other embodiments in e.g. Fig. 4A-4B', 4E, 4E', any excess protective layer 3 covering the removal portion 12 is removed by a further punch (not shown), arranged on the same side as first and second rolls 10a, 10b cutting through the protective layer 3 but not through the removal portion 12. According to one embodiment, a lower adhesion of the removal surface portion 12a, is carried out according to any of the ways as described in this description.

[0092] According to one embodiment, the parts 2, 3, 9 to be formed into the device 1 as well as part 8, has a width opposite the feeding direction which corresponds to the width of the device 1. According to one embodiment, the parts 2, 3, 9 to be formed into the device 1 has a width opposite the feeding direction which is larger than the width of the device 1. The punches 7a, 7b, 7c may thus have various shapes and be configured to punch in either a lengthwise feeding direction or a direction perpendicular to the feeding direction or both. According to one embodiment, the punches 7a, 7b, 7c are rotary punches. According to one embodiment, the feeding is carried out in a continuous manner, i.e. at a continuous speed. According to one embodiment, the punches 7a, 7b, 7c, are flat punches. In the latter case, the feeding of the parts 2, 3, 8, 9 may be carried out in a stepwise manner. The punch 7c may also be configured to shape the portion 3a e.g. as seen in 1, 1'. The punch 7c may also be configured to shape the portion 3a such that the portion 3a extends outside the boundary 2d along the entire side of the device 1 or at least along a part of the side or along one of several sides. According to one embodiment, the punching carried out by the punch 7c extends through the latex sheet or thin elastomer film 8 and the material layer 2 outside either side of or at least outside at least two sides of the punch forming the sampling volume 2a. According to one embodiment, forming the portion 3a using the further punch 7c, is carried out by defining the distance between at least two opposite sides of the punches 3a₁ and 3a₂ to be greater than the distance between the punching lines 2d₁ and 2d₂. According to one embodiment, the distance

between at least two opposite sides of the punches $3a_1$ and $3a_2$ is greater than the distance between the punches $2d_1$ and $2d_2$ at least where the portion $3a$ is formed. Hereby, the method produces a portion $3a$ irrespective of the exact placement of the punches in relation to each other and the parts 2, 3, 8, 9. The method/process allows a slight displacement, offset either to the right or left in Fig. 5A, i.e. forwards or backwards in relation to the direction of feeding with regards to the previously formed punching lines $2d_1$ or $2d_2$. The displacement, may be offset in a direction perpendicular to the feeding direction as well. If a punching by punch $7c$ occurs offset slightly to the right, some waste in the form of material layer is formed to the right of $2d_2$, as well as potentially a further portion $3a$ extending beyond the boundary of the surface portion $2c$ which can be used to facilitate removal of the protective layer. On the left side of punching line $2d_1$ the length of the portion $3a$, i.e. the larger width between $3a_1$ and $3a_2$ to be greater than the distance between the punches $2d_1$ and $2d_2$ ensures this. If, on the other hand, a punching by punch $7c$ occurs offset slightly to the left the effect is simply that a slightly larger portion $3a$ is formed, i.e. that this portion $3a$ extends beyond the boundary of the surface portion $2c$ or the circumferential portion than would otherwise have been the case. According to one embodiment, the punch $7c$ is configured, e.g. by the shape of punching portions, to form portions $3a$ at opposite sides of a side of the device 1 for every other, or any other sequence, device 1 being formed. Every second device 1 formed will thus be similar and mirrored in relation to the previous. According to one embodiment, a facilitated packaging, e.g. comprising a more equally distributed arranging of the shape and weight of the devices 1 is enabled in a subsequent packaging step. According to one embodiment, the packaging into, as well as a subsequent removal of the devices from, into small plastic bags are facilitated. A plurality of devices 1 may, due to the possibility for mirrored versions of the devices 1, be arranged with their protective layers, i.e. of considerably lower friction than the latex sheet or elastomer film, pointing outwards, towards the side of the plastic bag. The devices 1 can be arranged inside the bag in various constellations, however preferably two prerequisites are fulfilled, the outermost devices 1 have their low friction sides pointing outwards towards the side of the bag, and the devices 1 are arranged so that their portions

3a are aligned with each other. Preferably, the portions 3a are facing the bottom of the bags where they are not in the way of an operators fingers when gripping for a device 1 inside the bag, which could influence the portion 3a and an unwanted removal of the protective layer 3. Arranging the portions 3a aligned to each other further increase the overall ability of the plurality of devices to withstand unwanted influence on e.g. the exposed portion 3a of a single device and not having its portion 3a aligned with the other portions 3a.

[0093] Fig. 5B, shows the method according to Fig. 5A and what has been described in relation to this. Thus, as explained above, the method comprises feeding an elongated material layer 2, and a protective layer 3 and latex sheet or thin elastomer film 9 arranged on a respective side of the material layer. Further, the method comprising forming the sampling volume and the filler device, by punching through the material layer using a punch. The method further comprising removing the filler device 2b as described below. In addition, according to one embodiment, a roll 10c' and roller 10c" have been arranged between rolls 10c and 10d to remove the filler device 2b. The roll 10c' applies an adhesive tape layer 16 that sticks to the filler device 2b, and the adhesive tape layer 16 including the adhered filler device 2b is thereafter rolled onto roll 10" to remove the filler device 2b. The roll 10c" is suspended to move upwards and allow a growth of rolled up adhesive tape layer 16. According to one alternative embodiment for removing the filler device 2b, another roll 10d' may be provided after roll 10c, which have an adhesive surface in order to make the filler device 2b stick to its surface.

According to one embodiment, on the opposite portion or another portion of the roll 10d', the filler device 2b is directly removed from the roll 10c' e.g. mechanically or by using air, such as compressed air. According to one embodiment, blowing a puff of air, such as e.g. compressed air, using an air puff device 18a towards the filler device for instance towards the side of the rolls 10 and 10b causes the filler device 2b to leave the sampling volume 2a. Thus, removing the filler device 2b is carried out by blowing a puff of air directly in the filler device 2b. According to one embodiment, a device providing negative air pressure such as e.g. vacuum, e.g. a vacuum device 18b, removes the filler device 2b from the sampling volume 2a. According to one embodiment, the air puff device 18a or vacuum device 18b is

arranged on the opposite side of the device, acting in an opposite direction. Thus, removing the filler device 2b is carried out prior to applying a latex sheet or thin elastomer film 9. The method thus comprises applying the latex sheet or thin elastomer film 9. According to one embodiment, following removal of the filler device 2b, compressed air, e.g. via an air knife device 17, or a compressed air nozzle 17, is blown to remove any spill, waste or residues from punching. According to one embodiment the air is blown in a direction towards the sampling volume 2a. At the same time any unwanted particles from the surrounding air in a production facility is removed. Especially, such spill, waste or residues are removed from the sampling volume 2a prior to applying a latex sheet or thin elastomer film 9 in order not to contaminate the sampling volume 2a. Thus, removing the filler device 2b in the manufacturing, further enables a cleaning of the created sampling volume 2a leading to an improved product and quality as the risk of contamination is reduced. Such contamination may lead to that the waste particles are eventually dissolved in the washing/extraction liquid. This may affect the subsequent analysis in a negative way, for instance leading to erroneous or misleading results. Another effect may be that such liquid including waste may eventually cause a malfunction of the syringe. Waste particles dissolved in the liquid may aggregate and clog areas between moving parts of the syringe, e.g. the plunger or the seal and a barrel, increasing friction. According to one embodiment, at least one air knife device 17 is used. According to one embodiment, a plurality of air knives 17 are used, such as e.g. two or three. For instance, a plurality of air knives 17 could blowing air at various angles on the product and covering separate areas of the same in order to enhance waste removal. Generally, over time and after a certain number of punches, the punch edges are becoming more and more dull, i.e. less sharp. As an effect, more waste is generated in the process which further increases the risk of contamination and, consequently, enhances the effect of using at least an air knife 17 for waste removal from the sampling volume 2a. According to one embodiment, the similar method steps relating to forming the sampling volume 2a and filler device 2b by a cut out of any combination of layers forming a device, and further for removing the filler device 2b and waste/spill may be applied to any embodiments described in

Fig. 2A-2G, Fig. 3, by the skilled person as well. Thus, the method comprises forming a circumferential edge portion of the of the material layer by punching through the latex sheet or thin elastomer film and the material layer using a punch for forming a circumferential edge portion of the material layer, and forming the protective layer by punching through the protective layer using either the punch and when forming the circumferential edge portion, or using a further punch for additionally forming a portion 3a, whereby the punching, or at least part of the punching, is carried out outside the circumferential edge portion. Further, according to one embodiment, the method comprising blowing compressed air towards the sampling volume for cleaning the sampling volume 2a after removing the filler device and prior to applying the latex sheet or thin elastomer film.

[0094] A preferred embodiment of a device for surface sampling according to the invention has been described. However, the person skilled in the art realizes that this can be varied within the scope of the appended claims without departing from the inventive idea.

[0095] All the described alternative embodiments above or parts of an embodiment can be freely combined without departing from the inventive idea as long as the combination is not contradictory.

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CLAIMS

1. Device (1) for surface sampling, comprising:

a material layer (2) comprising a surface portion (2c) and a circumferential edge portion (2d) defining the boundary of the surface portion (2c), further comprising a sampling volume (2a), wherein the sampling volume (2a) is adapted to comprise a filler device (2b) for filling out the sampling volume (2a),

a protective layer (3) arranged on the surface portion (2c) of the material layer (2) by an adhesive (4) arranged on the surface portion (2c) of the material layer (2),

wherein the device (1) is configured to be attached to a surface (15) by removal of the protective layer (3) to expose the adhesive layer (4) prior to attachment, wherein the device (1) is further configured to receive washing/extraction liquid in the sampling volume (2a) during attachment to the surface (15),

characterized in that the sampling volume (2a) does not comprise a filler device (2b).

2. Device (1) according to claim 1, wherein the device (1) further comprises a removal device (12), wherein the removal device (12) is fixedly arranged to the material layer (2), wherein the removal device (12) further comprising a removal surface portion (12a), wherein the removal surface portion (12a) is adapted to provide a lower adhesion against the surface (15) compared to the adhesive (4), wherein the removal surface portion (12a) is facing essentially the same direction as the surface portion (2c).

3. Device (1) according to claim 2, wherein the removal device (12) is integrated with the material layer (2).

4. Device (1) according to claim 2, wherein the removal device (12) comprises at least a portion of a layer (13) arranged intermediate the adhesive (4)

and the material layer (2), wherein the layer (13) is arranged to the material layer (2) by a second adhesive layer (4').

5. Device (1) according to claim 2, wherein the removal device (12) comprises at least a portion of a layer (14) arranged intermediate the material layer (2) and a further film layer (9), wherein the layer (14) is arranged to the material layer (2) by a third adhesive layer (4").

6. Device (1) according to claim 4 and 5, wherein the removal device (12) comprises at least a portion of the respective layer (13) and (14).

7. Device (1) according to any of the preceding claims, wherein the material layer (2) comprises a plurality of separate layers (2.1, 2.2, 2.3)

8. Device according to claim 7, wherein the removal device (12) is integrated with at least one of the layers (2.1, 2.2, 2.3).

9. Device (1) according to any of the preceding claims, wherein the material layer (2) is a foam layer.

10. Device (1) according to claim 9, wherein the separate layers (2.1, 2.2, 2.3) are separate foam layers.

11. Device (1) according to any of the preceding claims 7-10, wherein the removal device (12) is arranged between two separate layers (2.1, 2.2, 2.3) of the material layer (2).

12. Device (1) according to any of the preceding claims, wherein a protective sheet layer (12a') is arranged on the removal surface portion 12a covering a portion of the adhesive (4) on the surface portion (2c).

13. Device (1) according to any of the preceding claims, wherein the removal device (12) comprises a further removal surface portion (12b), wherein the further removal surface portion (12b) is facing an opposite direction in relation to the surface portion (2c).

14. Device (1) according to any of the preceding claims 2, 4-7, 9-13, wherein the removal device (12) extends beyond the boundary of the surface portion (2c).

15. Device (1) according to any of the preceding claims 2-3, 8, 9-13, wherein the removal device (12) comprises a bulge of the surface portion (2c).

16. Device (1) according to any of the preceding claims, wherein a portion (3a) of the protective layer (3) extends beyond the boundary of the surface portion (2c) for facilitating a removal of the protective layer (3) from the material layer (2),

17. Device (1) according to claim 16 and (14 or 15) wherein the removal device (12) extends in a direction parallel to the portion (3a).

18. Device (1) according to claim 17, wherein the removal device (12) is covered by the portion (3a) of the protective layer (3), wherein the portion (3a) extends further than the removal device (12).

19. Device (1) according to claim 16 and (14 or 15), wherein the removal device (12) extends in a direction perpendicular to the portion (3a).

20. The device (1) according to any of the preceding claims, wherein the material layer (2) is flat.

21. Device (1) according to any of the preceding claims, wherein a layer (13) is arranged intermediate the adhesive (4) and the material layer (2), wherein the layer (13) is made of a material having a higher cohesion than the material layer (2).

22. Device (1) according to any of the preceding claims, wherein the adhesive (4) comprises silicone.

23. Device (1) according to claim 22, wherein the adhesive layer (4) comprising silicone has a thickness of 0,01-0,05 mm, wherein a layer (13) is arranged intermediate the material layer (2) and the adhesive (4), wherein the layer (3) has a thickness of 0,02-0,15 mm.

24. Device (1) according to any of the preceding claims, wherein the amount of silicone in the adhesive (4) is such that it enables at least a 3 ml injection of water into an ISO-8502-6 BreslePatch attached to a surface 15, with no visible leakage during a 5-10 minute period.

25. Use of a device (1) according to any of the preceding claims 1-24.

26. Method of using a device (1) according to any of the preceding claims 1-24, comprising the steps:

removing the protective layer (3) to expose the adhesive layer (4) prior to attachment,

attaching the device (1) to a surface (15),

injecting washing/extraction liquid in the sampling volume (2a) during attachment to the surface (15),

sucking out washing/extraction liquid for retrieval and transferring to a cylinder for further analysis or directly into a microconductometer.

27. Method of using a device (1) according to claim 26, wherein the surface (15) comprises silicone.

28. Method of manufacturing a device (1) according to any of the preceding claims 1-4, 14-24, the method comprising:

- feeding an elongated material layer (2), and a protective layer (3) and latex sheet or thin elastomer film (9) arranged on a respective side of the material layer (2),
- forming the sampling volume (3a) and the filler device (2b), by punching through the material layer (2) using a punch (7a)
- removing the filler device (2b),
- applying the latex sheet or thin elastomer film (9),

- forming a circumferential edge portion (2d) of the of the material layer by punching through the latex sheet or thin elastomer film 9 and the material layer (2) using a punch (7b) for forming a circumferential edge portion 2d of the material layer,
- forming the protective layer by punching through the protective layer (3) using either the punch (7b) and when forming the circumferential edge portion (2d), or using a further punch (7c) for additionally forming a portion (3a), whereby the punching, or at least part of the punching, is carried out outside the circumferential edge portion (2d).

29. The method according to claim 28, further comprising:

- blowing compressed air towards the sampling volume (2a) for cleaning the sampling volume 2a, after removing the filler device (2b) and prior to applying the latex sheet or thin elastomer film (9).

30. Method according to any of the preceding claims 27-29, whereby forming of the sampling volume (2a) is carried out using a first punch (7a) and adding a latex sheet or thin elastomer film (9) is carried out before using the punch (7b) for forming the circumferential edge portion (2d).

31. Method according to any of the preceding claims 27-30, wherein the punching using the punch (7b) for forming the circumferential edge portion 2d, forms at least punching lines (2d₁) and (2d₂) having a first distance there between, and wherein the punching using punch (7c) for forming the portion (3a), forms at least punching lines (3a₁) and (3a₂) having a second distance there between, wherein the second distance is larger than the first distance at least where the portion (3a) is formed.

32. Method according to any of the preceding claims 27-31 wherein forming the portion (3a) is carried out by punching through latex sheet or thin elastomer film (9), the material layer (2) in addition to the protective layer (3).

33. A device 1 for surface sampling manufactured by the method according to any of the preceding claims 28-32.